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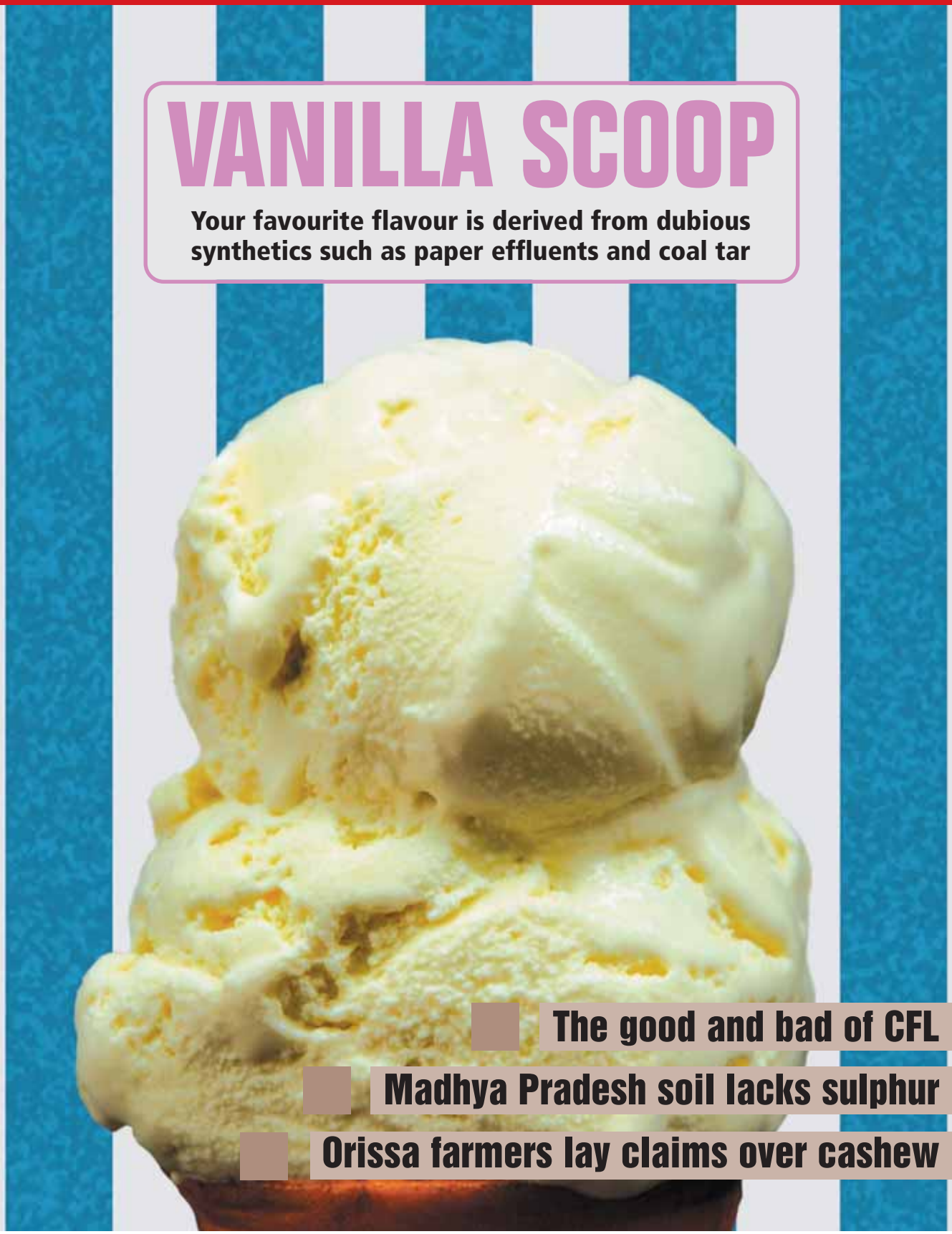

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Vanilla, the most popular flavour in confectioneries, is lucrative business. It sells millions of dollars worth of cakes, ice creams, cosmetics and a lot of things nice. But most of it is synthetic stuff of dubious variety

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Cherrapunjee still gets a lot of rainfall. But the water runs down leaving the place a wet desert

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COVER PHOTO: VINITA VENUGOPAL

MANIK BOSE

Retailing trouble

This is in response to the article 'Fresh trouble' (June 30, 2007) the interests of the small street sellers in India should be protected. It should be ensured that the government's plan to open up the retail sector to big companies should not affect the small farmers. The move is just another example of government high-handedness.

ARVIND K PANDEY
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➡ The article depicts vendors as people who can be easily manipulated. We conducted a survey among Mumbai's street vendors who operated within 2 km of the Big Bazaar stores. Over 70 per cent of them said their sales dropped significantly. The article should have assessed the environmental consequences of corporate retail. Retailing should be a level-playing field.

CHERYL DEUTSCH NATIONAL HAWKERS FEDERATION
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➡ I stayed in Mumbai for 25 years. Vegetables are grown in bad environments in Mumbai. Why should consumers suffer because of the unhealthy preservation practices followed by street vendors, like using sewage water to keep vegetables fresh? I hope retail chains will bring in good food standards.

ABHIJIT
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SEZ not bad

It's shocking that fertile land is being offered to Reliance in Haryana (Reliance through, June 30, 2007) when farming is the need of the hour. A SEZ should be created only on a degraded land so that the region too could be developed. SEZ is not a dirty word. If the state handles them properly, it can help people progress.

D B N MURTHY
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Tehri under threat

Apropos the article 'Troubled in Tehri' (June 30, 2007), there was a lot of concern over the fracture in the rocks supporting the Tehri dam. The issue has now once again come to light with the Wadia Institute of Himalayan Geology and the Geological Survey of India pointing out the problem of unstable landslides, fragile rocks, erosion of land and sedimentation of the dam.

Why did the authorities neglect these serious issues when the dam was being built? Moreover, the people who were ousted for the dam were not properly compensated. Other dams with impacts on the Himalayan region, including the Bhakra dam, have long been experiencing similar problems.

G S CHATHA
Bhakra road, Nangal

Out of the fringes

The leader, 'Animal of parts', (May 15, 2007) dismisses the moral dimensions of tiger farming as 'fringe faddism'. Your magazine has been exposing the way humans exploit nature. Isn't tiger farming an example of this? If so, isn't the practice immoral?

ALAN HERBERT
alan@auroville.org.in

All in the game

The cover story, 'Whose forests?' (June 15, 2007) was a good write-up on the historical background of post colonial Indian forestry. It, however, did not provide a definition for forests in the Indian context. What does one want from our forests? How does one want to manage them? Whose requirements are to be satisfied here? Everyone is biased. And everybody wants a patch, as your story aptly put it.

I spent more than 35 years in the forest service and can only say that one day we will understand the forest department's contribution to forests. I do not want to cover up the mistakes of the department but political expediency has played havoc with the system.

The current debate makes me believe in giving back forests to those it belongs to. Dispense with the official system. Help people manage forests. Observe them for a decade and then decide on a definition. I am past 70 now and may not be here to see the results.

I need to point out another curious fact. Two years back, a *Down To Earth* story put the value of India's forests at Rs 59,20,190.2 crore (July 31, 2005). Probably this could have made everyone go in for a slice of the cake.

A R MASLEKAR
aaraam@pn2.vsnl.net.in

Where's the good news?

Down To Earth always reports negative issues. For example, your cover story on garbage in Indian cities, '120,000 tonnes everyday' (March 15, 2007) presented the waste problem quite well but it did not mention any adoptable solution.

Many in India are effectively dealing with this issue today. I talked to someone who helps people in rural Andhra Pradesh develop garbage disposal into a viable business. Readers are also interested in reading such success stories.

SIVA
prasadgummadi@yahoo.com

PICK OF THE POSTBAG

Images of neglect

I am sending two images to show how aware our authorities are on issues affecting the the environment. The Gomti river which supplies water to Lucknow is filled with waste from detergent factories and labs.

The surface of river is covered with alga bloom causing the death of aquatic flora and

Animal care

Apropos the editorial 'When markets do work' (June 15, 2007) animal care is under much risk today, worse than the fate of agriculture. India does not have a fodder policy.

Animals play an important role in village economy and even their cultural activities reflect this truth. The *erakka* day, celebrated in my area in Medak district of Andhra Pradesh, is a good example. The villagers feed animals the best of the fodder and celebrate it. Such reverence for animals needs to be understood by our policy makers.

ASHA KACHRU, MEDAK
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➡ The example of a village sustaining on rearing cattle in the face of severe drought made good reading. However, given the articles that *Down To Earth* carries on the threat to wildlife from human interventions, your suggestion that forests should be open up for grazing is surprising.

Wildlife is threatened by poachers and loggers on the one hand, and also by cattle grazing. There are other forms of human interventions as well.

Grazing brings the predator and the prey in close contact, and causes knee jerks such as trapping and poisoning by those who lose their cattle. Not to mention that grazing can soon lead to overgrazing and as you correctly quoted "…put pressure on the ecosystem".

Wild animals have their own way of life and need their space in the shrinking forestland. Ensuring their survival is in the best interest of our ecosystem.

Grazing does not need virgin forestlands. A person in Kerala has transformed a dry area into green through his continuous efforts of planting saplings and nurturing them. If individuals can do it, then a village can do wonders.

SOWMYA
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Land grabbing for commercial use is a serious problem in rural areas. Comprehensive planning on rural land utilisation is essential to deal with the issue. The *panchayat*s have to be trained in this regard.

C R BHATTACHARJEE
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Efficiency debate

This is with reference to your editorial, 'Efficiency versus democracy' (June 30, 2007). The editor seems to be on a permanent negative mode. Can she dig deep in history and find a few 'glaring' examples of violation of EIA by TATAs?

Is there anything wrong in an industrialist writing to the prime minister about delays in projects which are caused more by political rivalry than scientific reasons? Please cite one incident where you have found efficiency in India.

M RAMACHANDRAN
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? help

Plastic problem

In my *panchayat*, the authorities have dumped a huge load of plastic waste into a pit. They have been doing this for a while. Pollution from the dump yard has affected our normal life. We have complained many times but to no avail. We need help and suggestions.

JOSE A KACHIRAMATTAM
kachiramattam50@rediffmail.com

fauna. The government has not taken any step to check this.

The second image is of the government polytechnic building here. The rain water harvesting system here is in acute state of neglect.

MAYANK PANDEY
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Causing loss

This is with reference to the cover story, 'Undermined' (July 15, 2007). I really appreciate the report which has talked about the ground realities. Vedanta's bauxite mining complex at the base of the Niyamgiri hill is not a development project but a plan to exploit nature. It will also cause cultural, social and biodiversity loss.

RANJAN KUMAR AMRITNIDHI
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What's brewing?

Apropos the story 'Not brewing right' (August 15, 2006), nobody has yet come out with any concrete suggestion to help the Darjeeling tea industry. Everybody is looking towards the government to bail out options. The administration has given grants thorough the latest revamp schemes, now it is up to the companies to make use of this.

The trade unions, the government and various civil society and management associations need to act in unison.

The industry deserves a brighter future. The answer lies is in progressive marketing practices in India as well as in the foreign market.

Organic tea production is also part of the solution to the problem but if its marketing aspect flounders where will the organic movement be?

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CLARIFICATION

Parthasarathi Banerjee, acting director NISTADS, Delhi, who was quoted in the report, 'Property wrongs' (April 15, 2007), wants his quotes withdrawn. When he commented on the controversial Bayh Dole Act, little did Banerjee know that our correspondent would quote him. And that too, without any pre-ratification.

Down To Earth welcomes letters, responses and other contributions from readers. We particularly welcome you to join issues and share your opinion with others. Send to Sunita Narain, Editor, *Down To Earth*, 41, Tughlakabad Institutional Area, New Delhi - 110 062. Email: editor@downtoearth.org.in

Climate science and the Indian scientist

Will Indian scientists measure up to the challenge of climate change? I ask this question because of the nature of the science as well as the nature of our scientists.

Climate change science is young, being tutored and evolving. We know much more today about what the future will hold if we do not reduce emissions drastically. Yet our knowledge is still probabilistic. It concerns changes we can model for climate sensitivity, using the best evidence we have today. But all models are victims of their assumptions. And all predictions are villains of their times. The challenge is that even if we know little about how the accumulation of greenhouse gases will impact us, we cannot afford to wait until we have all the answers. We can't afford to be uncertain in our actions, even if we are uncertain about our science.

Take glaciers. We know that glaciers melt. It is because of this melt that we get water. But are these glaciers melting at an unnatural pace today? Will such melting lead to more water in our rivers to begin with, leading to floods, and then less, leading to water scarcity? The answers, after much scientific skulduggery, are just beginning to crystallise.

Western scientists agree that something is afoot. They know because they can physically map the glaciers to see the pace of the recession. They can also measure the mass—average ice thickness—to check for reduction. In addition, complex statistical models—which combine evidence from several observational datasets—are confirming the probability of this rapid recession.

These models had initially not predicted that melt water would seep into the crevices of the glaciers, lubricate them and so accelerate melting. When this was physically noticed, it was factored into the models for greater reliability. But there are many unanswered questions. For instance, will there be a collapse of the Antarctic ice sheet? There are huge uncertainties regarding critical thresholds of collapse. But in all this, uncertain science cannot afford to breed complacency. It has to reveal what it knows, with what measure of reliability and also discuss what it does not know, as yet, because of its own limitations of data or understanding. It is growing, but after all, it is a young science.

In India, we are just beginning to map impacts on our glaciers because of human-induced climate change. We can draw inferences from the changes that are being observed and predicted in the rest of the world. But we will have to do our own leg work—to understand both what is happening and what the receding glaciers will do to our water security. The question is: can we do this?

I ask this because in many ways climate change science, because of its many variables and very many scenarios, is a game of chess which can only be played by investigative and highly inquisitive minds. The scientist will get clues and the answers will have to be tweaked: from scientific evidence, from plain common sense and from what can be observed in the real world.

It is not in the nature of our science to do this kind of imaginative, investigative research. It is certainly not in the manner of our science to draw inferences when there is uncertainty. In the easiest of times, our scientists find it against their nature to cross over the threshold, from what is already established science to what is emerging science. They prefer to play safe with what they know. In the case of climate science, they prefer to be cautious in their words, very conservative in their assessment and take refuge in the inherent uncertainty of science.

For instance, it will be easy for 'safe' science to say that even if glaciers are receding at a rapid pace, it is nothing new or surprising. They are simply passing through a phase of recession as a natural cyclic process. It will also be possible to say (and I have heard this said very recently) that even if we know glaciers are melting, there is no evidence to say that this melt will lead to any significant changes in our hydrological systems. Why? Because our ongoing research does not show anything deviant. It is another matter that the data or method used for the research might be insufficient. Or that the scientist may not have investigated the slim leads that nature was disclosing about herself.

Let's accept that there is a problem. The Indian scientific establishment has been for far too long just that, an establishment. It has chosen only to work with established science that is peer-reviewed, empirical and unchallenged. Worse, because of the nature of its institutions—which are closed to outsiders on the one hand but subservient to officialdom on the other—it will not engage in any public discourse.

But climate science demands new approaches. It demands breaking away from what is already known to discover what needs to be known and how. It will require crossing the line so that inferences can be drawn, however tentative. It will require, most of all, active engagement with the 'outside' world of ordinary people. It will need to pay careful heed to everyday events and meticulous observation of scientific processes as they play out in our gardens, in our agricultural fields and in our glaciers.

Finally, if I can say (without offence), Indian science, to respond to climate change, will have to get a little less male and perhaps even a little less old. 'Male' science (if we can allow for some generalisation) is not interested in soft issues like the environment or nature. These are non-issues in a world of nuclear, space or rocket technologies. Why young? Because climate change science (and the world) needs all the impatience and the desperation of the young. ■

—Sunita Narain

Stories of success and failure

Most times there is a critical link between the two

SAMPAT Lal is not the protagonist of a typical *Down To Earth* story. He's the treasurer of a cooperative that runs a fair price shop in a Rajasthan village. Quite successfully, in fact. Lam belongs to a cooperative of mine workers. There are quite a few such cooperatives in Rajasthan now (see *Deep Unity*, pp 44-45).

Thanks to these associations, mine-workers can expect a fair deal in many parts of the state. The success of the fair price shop run must also be seen in the context of the general failure of the PDS in the country. 58 per cent of the subsidised food does not reach the families below the poverty line (see *Distribution matters* p 58). Faulty targeting, ghost cards and low quality provision dog most of these outlets.

But it's not just the PDS system. A lot of the institutions meant for the poor have failed them. It's a failure which we report consistently, often at the cost of appearing hackneyed. In fact, a section of our readers often complain that we go overboard with negative stories.

Perhaps they have a reason. To a lot of the world, "India is shining". Reinforcement comes in the form of malls and glitzy retail stores that sell fresh carrots. The middle classes in even small towns feel very little pinch with the 'discounts' offered at snazzy retail outlets. A story about the failed PDS comes as a spoilsport in such a scenario.

Besides even when it's a successful venture, how can a modest PDS shop compete with such glitz? So, endeavours such as those of Lal's cooperatives rarely find a place in the narratives of success that are the flavour of the media today. But common grounds there are aplenty between the mine worker's endeavour and the negative stuff that we have been accused of peddling. Our correspondent was witness to the happiness in Lal's village, Ummarwas—in Rajasthan's Rajsamand district—because the fair price shop was running well. It wasn't a facile show meant for an outsider. The people were happy because a difficult existential problem had been overcome: it's difficult to get even the basic provisions if you are poor in India. We usually report about such difficulties. But we also try to find people who have overcome such odds. We also understand that there are disjointed good news scattered all over India. The point is how to connect them to fight the bad news. ■

Virtual interaction

Recent computer games and individualism

A STUDENT group in Iran has recently produced a computer game that is a clever mix of the standoff over their country's nuclear programme, the mystery of missing diplomats in Lebanon and Iran's traditional animosity against Israel. Players must save captured Iranian diplomats and nuclear scientists from the clutches of US and Israeli abductors. The successful ones kill the US and Israeli soldiers, steal their laptops which hold secret information before liberating the scientists and the diplomats.

Computer games have come a long way off from the times when bizarre ogres or fantastic—almost Tolkiens-inspired—characters ruled the roost. The classic Tetris or the fantastic Tomb Raider could not be imagined as realms outside the computer—Angelina Jolie notwithstanding. But today computer games are no longer exclusive entertainment territory. Realism has become an important selling point for the game industry. That means not merely realistically rendered detail but a world with much resemblance to the outside universe: sound, physics, and most importantly, character behaviour. Like the Iranian game, the pure, plot-driven action very often comes attached with heavily politicised stories. Many commentators note that this marks a distinct affinity to films. But computer games are different in that players become actors; socially-minded films can only dramatise their politics, but computer games are interactive.

Interactivity, however, is a much-abused term. The games promote individualistic philosophy. A player's actions determine a game's outcome. Those in thrall to the medium say social simulation is educative. It, perhaps, is. Today, a gamer can get to know about the West Asian crisis, the mess in Darfur, about tsunamis and a host of real-time issues in a way that those enamoured by *Tomb Raider* could not. But then fighting a real-time war is not about the heroics of one soldier, managing crises is not about one's acumen. To be fair a lot of the games are nuanced enough to recognise that. *Darfur is Dying*, for example, has a host of characters from a family of eight to gun-totting militia. But gamers hold the reins, always.

Empowered by virtual rules, they can dispassionately test political assumptions. But the simulated civic tinkering will topple no banana republic, upset no financial market and cause no real person to suffer. It will however test the virtual skills of a lot of mouse potatoes. Let's see how many are sensitised. ■

Sulphur deficient

Low crop yield in Madhya Pradesh, farmers distressed

NIDHI JAMWAL / CSE

NANDITTA CHIBBER *Bhopal*

LAKKHAN Raghuwanshi had a bad harvest last monsoon. The farmer from Shyampur village, Guna district, cultivated soyabean, wheat and *chana* in 121 hectare (ha), of which he sowed soyabean in 61 ha. Despite the high-quality seeds sowed, the yield was a meagre 15 quintals per ha.

"I got my land tested and found that the low yield was because of low sulphur (essential nutrient) content in the soil. Earlier, I used to get 25 quintals per ha," he says. Other farmers in the state share the same woes.

Raghuwanshi now uses single super phosphate (SSP), a fertiliser to increase sulphur content in soil. "Small farmers, however, are not aware of the problem and are still using sulphur-free fertilisers like di-ammonium phosphate (DAP) and muriate of potash (MOP). This can create problems for them," he says.

Essential component

Madhya Pradesh's 150 lakh ha of crop area has a low cropping intensity. Experts say the low output has been triggered by a mild to severe sulphur deficiency in soil. A study by the Bhopal-based Indian Institute of Soil Sciences (IISS) says more than 40 per cent of agricultural soil in the 48 districts—mostly rainfed—of the state is sulphur deficient. "All the districts face the problem, with the magnitude depending on the intensity of cropping," says Mahavir Singh, project coordinator, micro nutrients, IISS.

A Subba Rao, director, IISS, explains: "Plants absorb sulphur from the soil in the form of sulphate (SO_4) through their roots; and to a much lesser extent from the atmosphere as gas. When it interacts with other nutrients, sulphur intensifies the production. If the sulphur content is less than 10 parts per million, it will eventually affect the crop's potential."

Rao maintains that the phenomenon also affects the oil content in oilseeds, reducing what experts call the 'synthesis of plant proteins and enzymes', for which sulphur is essential.

Not all farmers are aware of sulphur deficiency. Some continue to use fertilisers with low sulphur content

Cause and effect

Intensive farming method of rotational cropping over the decades have caused depletion of sulphur in soil, augmented by the excessive use of sulphur-free fertilisers like urea. "The depletion is accelerated in pulses and oilseeds like mustard, soyabean and groundnut, which demand high sulphur," says Rajesh Agarwal of the Soyabean Processors Association of India, Indore. But its replenishment was consistently ignored by the farmers and the state government, experts say.

According to Mahavir, during the 1980s, soyabean cultivation began in the rainfed and dryfed crop areas in Madhya Pradesh. The government encouraged intensive cropping practices like three crops a year. The five million ha of soyabean farmland in the state produces 80 per cent of the country's soyabean production. This comes primarily from the Malwa region, Satpura ranges and the Narmada valley in the state. Mahavir estimates that the soyabean crop yield in the 1980s was 0.8 tonnes per ha and currently it averages from 1-1.1 tonne per ha, an increase of only 0.3 tonnes per ha in the last 20

years even after seed quality and cropping techniques have drastically improved. According to him, the average rate for a quintal of soyabean varies between Rs 1,000 and Rs 1,200. Given this, Raghuwanshi who gets 15 quintals per ha of soyabean is losing an approximate Rs 10,000–Rs 12,000 crop revenue per ha. "There are other causes for the loss, but sulphur replenishment can save at least half the loss. If one rupee is spent for sulphur correction, the farmer can benefit Rs 5 to Rs 12, depending on the crop," he says.

Experts say that the use of canal water and rainwater for cultivation also do not supplement the sulphur loss. According to Rao, except in the industrial areas, rain water contains less sulphur. Crops irrigated with water from tube wells or groundwater stand a better chance of replenishment since it contains salts. While flowing, water in canal loses sulphur and it eventually drains sulphur out of the soil it irrigates, says Rao. In many instances, the problems occur without a visible symptom but at some places it has been observed that leaves become pale-yellow or light green, especially in plants which are small with short and slender stalks.

Madhya Pradesh government will train village extension workers and farmers on using nutrient-rich fertilisers and related farming practices

Government is subsidising sulphur-rich fertilisers. But is that enough?

NANDITTA CHIBBER

Saving crops

IISS recommends easily-available fertilisers like single SSP, ammonium sulphate and ammonium phosphate. According to Mahavir, using 8-10 tonnes of farmyard manure per ha can also help correct micronutrients deficiency. Adding 40 kg of sulphur per ha by spending about 300 kg of SSP per ha annually will step-up productivity, he says, adding that this can increase yields from 100-250 kg per ha, depending on the crop.

Though some farmers use mineral gypsum, which contains 13-18 per cent sulphur, scientists say the fertiliser is not viable since an additional fertiliser like DAP needs to be added to it. This demands further expenditure. In spite of the subsidy on gypsum, this will not be cost effective. Pyrites with 22 per cent sulphur content, used mostly for alkaline soils, does not contain sulphur in the sulphate form, hampering its easy absorption by plants.

Rahul Noronha, a farmer from Raisen district, says: "The need of the hour is to get farmers to get their soil tested and then use requisite fertilisers." Hemraj Singh, a small farmer cultivating 6.25 ha at Mohra village in Shivpuri district has sown soyabean and groundnut this season. "DAP is best for the crop," he says. DAP, popular among small farmers, is a composit of nitrogen and phosphorous which is appropriate for oilseeds. But according to experts, it has less sulphur, a fact many, like Hemraj, are unaware of. The farmer had even got his soil tested once.

"Farmers use such fertilisers because they are cheap and easily available," says Ravindra Sahu, assistant director (fertilisers), department of agriculture, Madhya Pradesh. "The government needs to promote the use of sulphur-rich fertilisers at a low price," says Mahavir. Spurious SSP reaching the market also needs to be fixed, he adds.

State action

The department of agriculture acknowledges the downfall in production but does not admit that farmers are ignorant. According to the officials, the department is working on methods to increase sulphur in soil. Four laboratories in the state are working on the problem, say department officials.

They claim to have taken measures to train 100,000 farmers through farmers collectives like *kisan mitr and kisan didi*. This, according to them, will ensure that every village has one person trained on agricultural practices, techniques and soil nutrients and their deficiencies. In addition to this, 19 agricultural training centres will educate village extension workers and the farmers.

A S Patil, joint director of the department, says, "Farmers are taking steps to check the problem. DAP is not being supplied everywhere; all dealers have been asked to stock SSP, especially in sulphur-deficient areas." The government has given subsidies to SSP manufacturers to sell the fertiliser at a cheaper rate—one bag (50 kg) of SSP for approximately Rs 171.

The department says it is planning to distribute 3.5 lakh tonne SSP to farmers for the 2007 *kharif* season, of which 2.9 lakh has already been distributed. Officials say that mineral gypsum is also available at 50 per cent subsidy under the Intensive Scheme for Oilseeds Pulses Oilpan and Maize initiative by the agriculture department. Patil says the nutrient index of land of every block and district is available with the state agricultural department.

However, according to Mahavir, the need of the hour is a policy where "the government should do systematic soil fertility evaluation census and scientific mapping every five years." Rao is hopeful and feels the agricultural debacle can be checked in the near future since swift measures are being taken to address the problem of sulphur deficiency in Madhya Pradesh. ■

NATURAL CALAMITY / JAPAN

Nuclear shocks

REUTERS

Earthquake in Japan has led to a series of radioactive leaks in a nuclear plant

An earthquake measuring 6.8 on the richter scale hit Japan on July 16, causing widespread damage and a radioactive leak in one of the world's biggest nuclear plans. The first quake had its epicentre around 24 km from Kashiwazaki city in Niigata Prefecture and 240 km from Tokyo. A second, deeper quake struck 13 hours later around 330 km west of the earlier epicentre, but it caused no damage.

The earthquake killed nine people, injured more than 1,000 and damaged or destroyed more than 900 houses. Around 12,500 people had to be evacuated from their homes in Niigata. Kashiwazaki city was the hardest hit. The earthquake also tore up roads, caused landslides and left a train derailed at Kashiwazaki station.

Japan experiences about 20 per cent of the world's major earthquakes and has developed an infrastructure to deal with them, including an elaborate system of disaster alerts. But the recent earthquake raised an alarm after two leaks were reported from the Kashiwazaki-Kariwa nuclear plant in Niigata, situated just 9 km from the tremor's epicentre. Authorities are checking the possibility of a third leak. A fire charred an electrical transformer in the plant, planks toppled into a pool of spent nuclear fuel and around 400 barrels of atomic waste fell over during the quake. Media reports say inspectors had identified four fault lines in the area while conducting a geological survey before the plant started in 1980, but had concluded that they were inactive.

The Tokyo Electric Power Co, which runs the plant, was criticised by Japanese prime minister Shinzo Abe for being slow to announce details about the damage at the nuclear plant. Criticism has also come from environmental groups. "You cannot have nuclear power without public trust," said Jan Beranek, nuclear energy project leader with Greenpeace. "And you cannot trust people who don't tell you the truth or who build nuclear plants in earthquake zones," he added.

Meanwhile, Japan's trade ministry has ordered the plant shut until its safety is assessed. ■

SANITARY WARES DO THE CATWALK

A unique 'beauty contest' was organised in Kerala's Nagapattinam district on July 14, the contestants of which were 'ecosan toilets' made in tsunami-hit areas. Eligibility: families that were part of the first batch of 100 "ecosan toilet families" in the district's Kameshwaram village, those who used it properly and those who maintained the kitchen garden that was watered by urine. It was organised by Friends in Need of France, SCOPE of Tiruchirappalli and the Nagapattinam's rural development agency.

SCOPE

>> The department of justice in Wisconsin, USA, has sued US Oil Company Inc on July 10 for violating state air pollution laws. They alleged its fuel storage terminals in Milwaukee, Brown and Dane Counties emitted volatile compounds which are air contaminants under state law.

>> In order to make its cars more environment-friendly, the Ford Motor Company announced to change its car seats with soy-based foam by 2008. The first model to have such seats is the popular Mustang model.

>> Oil leakage from *Don Pedro* ship that sank off the port of Ibiza, Spain, has now broken through barriers and threatens the country's Ses Salines nature reserve, a protected area and nesting spot for migratory birds.

>> Brazil has said it will go forward with the construction of two proposed hydroelectric plants near the Bolivian border despite Bolivian claims that it had issued permits without studying its environmental and social impacts.

>> The Canadian company Eldorado Gold Corp announced the temporary closure of its Kisladag mine in western Turkey after the validity of the mine's environmental impact assessment was questioned in a Turkish court.

Mutually beneficial agreement

AGENCIA BRAZIL

DRUGS / BRAZIL

AIDS medicine prices lowered

The Brazilian government recently reached an agreement with the producers of the HIV/AIDS drug Kaletra to reduce its price by 29.5 per cent. Following the deal, Thailand has also demanded higher cuts than those in Brazil from the drug's producers Abbott Laboratories Inc.

The cost per patient per year for Kaletra in Brazil has been fixed at US $1,000. In June 2005, the Brazilian government had threatened to issue a compulsory licence for Kaletra. After four months of negotiations, Abbott dropped the price by 47 per cent with each Kaletra dose costing US $1.04 until 2007. But the recent deal fixed the price of each tablet at 73 US cents in 2007 and 68 US cents in 2008.

Later in the year, a new form of Kaletra will be out in Brazilian markets that does not require refrigeration. Only four doses of the new drug need to be taken every day rather than the present six doses. The company is also planning to cut the price for 45 other low and low-middle income developing countries.

Brazil provides HIV/AIDS drug free to an estimated 600,000 patients in the country at a cost of US $11.4 million per year.

FOOD TRADE / CHINA

China hits back

China has accused the international media of raising unnecessary alarm over the country's drug and food exports as increasing number of China's exports are being rejected due to contamination. "One company's problem doesn't make it a country's problem. If some food products are below standard, you can't say all the country's food is unsafe," argued Li Changjiang, China's minister for general administration of quality supervision, inspection and quarantine.

Lately, a growing number of Chinese products have been blacklisted by the US for containing potentially toxic chemicals and other adulterants. In retaliation, China recently banned US imports of chicken feet and pigs' ears to the country. The ban has affected imports of some of the biggest US meat producers like Tyson Foods, the world's biggest meat processor, and Cargill, the largest US agricultural company.

Meanwhile, the Chinese government has made new regulations for the registration and management of drugs to reform its ailing drug regulatory system. The regulations were announced on July 11, a day after the former head of the country's state food and drug administration, Zheng Xiaoyu, was executed for taking bribes and approving unsafe products. In another such check, China also banned the manufacture of toothpaste with diethylene glycol, a poisonous industrial solvent. ■

AIR POLLUTION / NEW ZEALAND

Death is in the air

Air pollution in New Zealand claims thousands of lives every year and costs the country billions of dollars, said a recent report.

A four-year study found that one in 20 people die earlier than they would have since air pollution claims 1,300 lives in New Zealand each year and costs the country around US $1 billion a year. The study was conducted by more than 28 science and health experts from New Zealand and Australia. New Zealand's Health Research Council and its environment and transport ministries funded the around US $800,000 study.

The study noted that bad air increased natural death rates per thousand people by nearly 5 per cent, with Nelson city the worst-hit area nationally and Christchurch the worst major city in the country. The biggest cause of pollution-related early deaths was said to be home fires except in Auckland where the main cause was vehicular emissions. The report used the 2001 census figures and studied 67 urban areas, covering three-quarters of the population.

New Zealand's environment minister David Benson-Pope said the report emphasised the need for councils to work toward air quality standards. ■

AGRICULTURE / SOUTH AFRICA

Virus resistant maize

South African crop scientists have come up with a new genetically modified (GM) maize variety that is resistant to maize streak virus (MSV). Field trials of the crop are scheduled to begin soon.

The finding was announced on July 8, 2007, at the annual meeting of the American Society of Plant Biologists in Chicago, USA. Scientists from the University of Cape Town and the South African seed company Pannar developed the new variety, which they claimed showed resistance to the virus in successive plant generations and in crosses with other varieties. MSV retards the growth of infected plants and causes them to grow deformed cobs, decreasing the amount of grain that can be harvested. The virus is endemic to sub-Saharan Africa and the Indian Ocean islands.

New South African GM maize is resistant to maize streak virus

But experts say MSV will have to be taken through field trials before its resistance is fully proven. A risk assessment of the plant also has to be done to check its impact on other organisms and the environment. Researchers said it would take around five years for the plant to come out as a commercial product. Dionne Shepherd, who led the research, said the main issue would be the cost of the crop, and whether it will be out of the purchasing power of the poor farmers who need it the most. ■

HEALTH / USA

Bon appetit

In an effort to improve residents health, King County in the US state of Washington banned the use of artificial trans fats for cooking at restaurants. It also asked nutritional information of foods to be mentioned in restaurant menus.

The ban comes into effect in May 2008. Restaurants have until February 2009 to find an alternative. Trans fats are produced by hydrogenation of vegetable oil and cause obesity and chronic diseases like diabetes. There has been a 37 per cent increase in obesity in the county since 1987.

New York city was the first to impose a trans-fat ban in 2006. The ban came into effect in July this year. The US state of Massachusetts and cities like Philadelphia, Miami, Chicago and Cambridge are also considering a similar ban. ■

Greasy food: On the way out

PRADIP SAHA

WEATHER / GREECE

European summer

A severe heat wave has hit most parts of central and southeastern Europe causing deaths, forest fires and damaging crops. Countries like Romania, Austria, Croatia, Hungary are reeling under the heat. In Greece, where temperatures reached 39° C on July 19, 115 cases of fires within a span of 24-hours were reported. Villages near the city of Corinth had been evacuated after a fire reached inhabited areas and destroyed at least 10 houses. A major highway had to be closed down and a children's home evacuated in Athens that was engulfed in smoke. Forest fires in the country also destroyed large tracts of forest on the Aegean islands of Skiathos and Lesvos.

Forest fires light up the night sky in Greece

REUTERS

Fire also raged over Mount Parintha for five days provoking warnings from conservationists. European Union environment commissioner, Stavros Dimas, described the Parnitha blaze as "a massive ecological disaster". Earlier this month, the residents of Athens rallied outside the country's parliament to protest against the failure of the authorities to avert environmental damage. ■

NUCLEAR ENERGY / NORTH KOREA

Towards disarmament

In the first step towards nuclear disarmament, North Korea shut down its main nuclear facility on July 14 in exchange for fuel aid. The Yongbyon nuclear facility in North Pyongan province was suspended under observation by inspectors from the International Atomic Energy Agency after South Korea delivered part of the heavy fuel oil promised in aid earlier.

This move follows a six-nation pact signed in Beijing in February 2007, where North Korea agreed to end its nuclear weapons programme in exchange for aid (see 'Beijing deal', *Down To Earth*, March 15, 2007). South Korea, China, the US, Russia and Japan had signed the agreement. One of North Korea's demands was to be removed from the US list of terrorist nations and the lifting of sanctions. US negotiator Christopher Hill asked the country to complete the second phase by 2007 end, in which it will disable the plant and declare all its atomic arms activities. ■

AFGHAN DEBT RELIEF: Afghanistan was recently granted interim debt relief meant for impoverished countries with heavy debt. Under the Heavily Indebted Poor Countries Initiative, Afghanistan will now have its net public and private debt payments cut by 51 per cent so that more funds can be utilised for healthcare, education and other essential services, according to the World Bank and the International Monetary Fund (IMF). Afghanistan's total overseas debt stood at US $11.9 billion last year. The US, Russia and Germany have also offered further debt relief to Afghanistan under the IMF. Russia and Germany will reduce 92 per cent of Afghanistan's debt with Washington forgiving 100 per cent of all debt payments, totalling around US $1 billion.

COAL IMPORTS BANNED: on July 15, Bangladesh directed its Importers and Exporters Federation to import coal from Indonesia or China. The move comes after a ban on coal imports to the country from two Indian states—Meghalaya and Assam—due to high sulphur content that may cause environmental and health hazards. This is not the first time that such an embargo has been imposed on Indian coal. Earlier, Bangladesh had withdrawn the order after pressure from its importers since Indian coal was cheap compared to coal from Indonesia and China. Indian exporters have been badly hit by the ban with the country losing Rs 200 crore in foreign exchange.

PAK FLOOD VICTIMS: Political parties in Pakistan have demanded the government use the money kept aside to buy the land for Kalabagh Dam for rehabilitation of flood victims in the country's Balochistan and Sindh districts. The leaders of Awami Tehrik claimed the government should spend the Rs 40 billion set aside for relief. Meanwhile, reports claim flooding due to the cyclone Yemyin that came last month has affected 900,000 people in the districts, with 200,000 left homeless. Flood waters in Sindh province also destroyed dams, homes, and agricultural land.

CLIMATE CHANGE / UK-NORTH SEA

Initiatives for change

An 80-day protest march was started in Belfast, Northern Ireland on July 15 to highlight the dangers of global warming. The march, organised by charity group Christian Aid, will travel through the UK and culminate in London on October 2.

The 1,600-km march is expected to get support from 50,000 campaigners who will petition UK's prime minister Gordon Brown to cut carbon dioxide emissions by 5 per cent a year until 2050, as well as support a replacement for the Kyoto Treaty to be agreed at the UN Bali conference in December. The march has a core group of 18 walkers, 10 of whom represent the UK and the other eight come from developing nations like India and China.

PUSH PICTURES

Lewis Gordon Pugh: A leap to save the world

Meanwhile, in another such protest, British adventurer Lewis Gordon Pugh swam for 1 km in the icy waters of the North Pole to draw attention to climate change. He took 18 minutes and 50 seconds to swim the distance in water measuring nearly –2°C in an area which had in the past been covered by the Arctic ice sheet. ■

WASTE / UGANDA-KENYA

Furore over plastics

A ban against the use of polythene bags in Uganda and a raise in duties on plastic bags in Kenya this month has evoked strong criticism from people. The ban and duty was to check the piles of rubbish that littered the urban areas in both the countries.

The ban has hit small businesses like sachet and packet makers for water, juices, milk and other beverages and edibles. Under the new regulations, companies are forbidden from producing, importing or using plastic bags in Uganda. Instead of using polythene shopping and packaging bags, which are locally known as *kaveera*, Ugandan officials have asked people to use banana leaves, the traditional material for carrying goods.

Kenya, too, recently passed a new by-law prohibiting the manufacture or use of polythene carry bags of less than 30 microns thickness. A hefty 120 per cent excise duty was imposed on plastic polythene bags. ■

WASTE / USA

Wasted lake

The US state of Illinois has reproached environment regulators in Indiana for permitting a BP refinery near the Illinois-Indiana border to dump more ammonia and industrial sludge into Lake Michigan.

More sludge to pollute the Michigan

USEPA

BP refinery has been exempted from Indiana environmental laws to clear the way for a US $3.8 billion expansion, which involves the processing of 54 per cent more ammonia and 35 per cent more sludge into Lake Michigan each day. Ammonia promotes algae blooms that can kill fish, while sludge is full of concentrated heavy metals.

Congress members from Illinois, Indiana and Michigan have also taken to task the US Environmental Protection Agency for not taking action against Indiana environment regulators who approved BP's proposal. State officials claim the project will create more jobs and "increase the diversity and security of oil supplies to midwestern US".

Meanwhile, BP markets itself as an environmental-friendly company. ■

IN COURT

WEED KILLER BAN: On July 11, the European Union's Court of First Instance at Luxembourg struck down an authorisation for the use of the pesticide paraquat issued by the Commission of European Communities (CEC). The court criticised CEC for poor health and safety assessments as it allowed the toxic chemical within EU. Paraquat had been banned in 13 countries including Sweden and Denmark. In 2003, however, CEC approved its use in the EU. Sweden, supported by Denmark, Austria and Finland, appealed to the court against this. Paraquat,a toxic chemical, affects the lungs, skin and eyes.

LAND TAKEN: Environmental groups recently filed a lawsuit in the US District Court in Denver, capital of Colorado, against the country's federal office of surface mining for renewing a coal mining permit in areas inhabited by the Navajo indigenous community. The lawsuit, filed by Din`E9 Citizens Against Ruining Our Environment, the San Juan Citizens Alliance and the Energy Mineral Law Center, said mining by BHP Billiton had forced Navajos away from their lands and exposed them to millions of tonnes of hazardous waste. They claimed the land was special to the Navajos since they used it for ceremonial purposes, grazing livestock and burying family members.

OIL PIPELINE /RUSSIA

In the pipeline

Russia's natural-gas exporter OAO Gazprom has announced to build a gas pipeline parallel to the Eastern Siberian oil link, which will lower the cost of supplying fuel to China and the Asia Pacific. It will use oil fields in the Yakutia Republic for supplying the oil. This was done keeping in mind China's increasing demand for energy due to faster economic growth.

Gazprom also said it would cooperate in the peace pipeline—the proposed oil pipeline running from Iran through Pakistan to India. Pakistan has welcomed Gazprom's participation. ■

Covering and uncovering mess

Dow Chemical asked to toe the line on spreading toxic chemicals after years of recklessness

SUNITA DUBEY *Arlington, US*

DOW Chemical has been asked to clean-up its act in the US. It's been charged with spreading contaminants. This comes soon after a row in India over shifting of toxic waste from the Union Carbide factory (owned by Dow) in Bhopal to a facility in Gujarat (see 'Eyewash', *Down To Earth*, July 15, 2007). On June 27, the US Environmental Protection Agency (EPA) notified Dow that it must immediately start cleaning up three dioxin-contaminated hot spots located along almost 10 km downstream of its plant in Midland, Michigan, by the Tittabawassee river.

The Dow plant is spread over 769 hectares. Dow has operated its manufacturing facility on the shores of the river since 1897, and over the years, it has manufactured a number of chemicals, including mustard gas, Agent Orange, napalm, and pesticides like 2,4,5-trichlorophenol, 2,4-D and Dursban (chlorpyrifos), which create dioxin as an unintended byproduct during production and/or disposal.

In wraps

Studies conducted in 1986 at various locations including schools, parks, and community areas showed elevated levels of dioxin, which prompted issuing advisories to avoid local fish, eggs, meat and minimisation of contact with contaminated soils. In 1996, EPA authorised the Michigan Department of Environment Quality (DEQ) to oversee the implementation of Dow's corrective action responsibilities. However, due to constraints within DEQ, there was only limited follow up done on contamination in the region.

Another study by DEQ, between December 2000 and June 2001, was mired in controversy. The study found that the dioxin-concentration ranged between 33 parts per trillion (ppt) and 7,261 ppt in the 34 samples collected. The results of the study were kept in wraps and came to public notice only when a DEQ official tipped off a local environmental group about the results. The documents revealed that the dioxin concentration was 25 times higher than the residential direct contact criteria of 90 ppt. They also brought to light the nexus between DEQ and Dow to downplay the dioxin threat in the region.

The nexus also entailed a "secret deal" between the two to create a dioxin zone with permissible limit of 831 ppt in the region. The deal, however, fell through in the wake of public and political pressure. As an explanation, Robert McMann, DEQ spokesperson, said that there were divergent views on the dioxin contamination and on the role of Dow in the community and therefore, they (DEQ) wanted to work with Dow to come up with a plan without being pulled in multiple directions by different stakeholders.

Advisory makes residents around the Tittabawassee river feel that they are hostages in their own homes

Tracey Easthope, director of environmental health with Ecology Center, Michigan, says the differences are because of the fact that Midland is a Dow town and a lot of people work in the Dow plant. But that does not give either Dow or DEQ the liberty to not share information on dioxins, she says.

Corrective measures

In 2003, Dow submitted a clean-up plan to DEQ. But that was full of loopholes. DEQ in turn, sent the plan back to Dow, which submitted a revised plan only in December 2006. In November 2006, before the submission of the revised plan, Ann Arbor Technical Services, an agency hired by Dow, identified several hot spots along a 9.5 km stretch of the Tittabawassee river, and noted that the areas were contaminated with dioxin levels up to 87,000 ppt, far in excess of the state requirement of 90 ppt. The hotspots are areas of concern as they are subject to flooding and erosion, which could further spread contamination.

McMann said that although not much clean-up was done in 2004-05, Dow had put up boardwalk along the river to warn people about the dioxin contamination. But Kathy Miller, a resident, says that they felt they were being held hostage in their own homes because they had to constantly wear masks and not allow their children to come in contact with soil. "Just informing that there are contaminants isn't enough," she said.

EPA in command

USEPA on July 7, 2007, reacted to Dow's revised plan saying, "Dow's description of historical plant operations and waste management practices has significant deficiencies. Dow has provided no specific information about the many hazardous constituents released by it into the watershed." EPA has also raised other issues such as Dow failing to report on environmental monitoring data to DEQ, and seeking confidentiality on public documents.

While Dow has agreed to comply with EPA orders, both Dow and DEQ are baffled at EPA's "sudden order" and "strict action". Community groups, however, have welcomed EPA's move and are hopeful about the clean-up. ■

Greenpeace's editorial afterthoughts

Questions raised over report in Orissa

WILL Greenpeace be banned in Orissa over its report on the 'controversial' Dhamra port project? Likely, if the state government has the final say. The issue was discussed in the state assembly on July 14, with the state commerce and transport minister Jainarayan Misra stressing the ban.

The project is a joint venture of the Orissa government and the Dhamra Port Company Ltd, a 50-50 joint venture of TATA steel and L&T. Greenpeace had commissioned a study of the port area to North Orissa University, which was released on June 8. In its report, Greenpeace, "citing the study," said that the port would be an "ecological blunder causing irreversible destruction".

SHYAMAL

But the researchers who carried out the study say their findings have been "abused" to suit "its (Greenpeace's) vested interests". Not just that, there were also "alarmist changes and addition of chapters that did not exist in the original report, besides changing the title of the report". This was disclosed on July 1, by Ashok Kumar, prinicipal secretary of the Higher Education department and Priyabrata Patnaik, principal secretary in the Orissa commerce and transport department, along with Sudarshan Nanda, vice chancellor of the university and S K Dutta, the investigator of the study.

Sensitive wildlife

Greenpeace, however, is on the defensive. It has accused the TATA group of not accepting the fact that the port will put "sensitive wildlife" at risk. "Dutta was aware of the changes to the report," said Ashish Fernandes, oceans campaigner of Greenpeace.

"Greenpeace has also made public the emails that it exchanged with Dutta. The bigger issue is that there is evidence that the site has endangered species. The group had promised to consider alternatives, they should act now," said Fernandes. Greenpeace also said that the government had jumped to the defence of TATA Steel. "TATA Steel officials refused to meet our campaigners when they went to their office," Fernandes added.

Meanwhile, Dhamra Port Company Ltd officials insist that the port had obtained environmental clearances, which was also upheld by the National Environment Appellate Authority.

The turtle carcasses that have been reported by Greenpeace may have come from anywhere beyond the site too, they say. Amlan Dutta, junior manager, environment, of the Dhamra Port Company Ltd, questions the relevance of the study because it was not conducted at the peak season of turtle activity and says that the time period over which fieldwork was done was too short.

S K Dutta, who has since remained unavailable for comment, stood by his findings at the press conference held on July 1. He is reported to have said: "I have not made any inference or suggestions in my report. I have only made an inventory study of the bio-diversity of the Dhamra estuary." ■

Leader in Oz

South Australia sets greenhouse gas limits

SOUTH Australia now has a law to tackle climate change. The Climate Change and Greenhouse Emissions Reduction Act 2007, legislates targets to reduce carbon dioxide emissions, as well as for production and consumption of renewable energy. According to the act, South Australia will reduce greenhouse gas emissions to an amount which is equal to or less than 40 per cent of 1990 levels, by December 31, 2050. It will also produce and increase consumption of at least 20 per cent of renewable electricity by December 31, 2014.

"South Australia continues to lead the way for the rest of the nation when it comes to climate change. We are on track to achieve the legislated target," said South Australia's premier Mike Rann. He also said that South Australia would match California's 'return to 1990 greenhouse pollution levels by 2020' target. California has proposed to reduce its greenhouse gas emissions to 25 per cent below 1990 by 2020 and 80 per cent by 2050.

South Australia's present GHG emissions are 6 per cent lower than 1990 levels, the cut-off date for the new rules. So, are they any advance?

But there is a catch. "The fact is that greenhouse pollution target for 1990 is a licence to increase, not decrease the state's emissions over the next 13 years," said Mark Parnell, the state's only green legislator. While South Australia is about 6 per cent below its 1990 greenhouse gas emission level in 2005; returning to 1990 levels would mean an increase in its emission. California on the other hand is above their 1990 level; in 2004 California was about 11 per cent above the 1990 level.

"The effect may be completely different; South Australia might just make things worse," said Parnell. ■

Eco-insensitive

Environment Tribunal Bill

NIDHI JAMWAL *Mumbai*

THERE'S been a last ditch attempt to protect local management of ecologically sensitive areas from the government axe. Environment groups in Maharashtra have approached the Union ministry of environment and forests (MOEF) asking it to not to disband local authorities and monitoring committees that are at present legally entrusted with the planning and management of these areas.

The immediate threat to ESAs comes from MOEF's draft National Environment Tribunal Bill, due to be taken up at the upcoming parliament session. The bill seeks to dissolve authorities set up under Section 3(3) of the Environment Protection Act, which includes all ESA authorities and also the committee set up for evaluating their proposals.

MOEF has proposed to set up a national level and four regional-level tribunals to implement the recommendations of the 186th Report of the Law Commission. The report discusses setting up of the tribunals and states that the National Environment Appellate Authority and National Environment Tribunal be dissolved. MOEF has gone even a step further by proposing to dissolve 16 such authorities.

The bill talks of handing over powers of the existing authorities/committees to State Level Environment Impact Assessment Authorities, the agency responsible to grant or reject environment clearances under Environment Impact Notification, 2006. This move will severely impact localised management and monitoring of ESAs, say environmentalists . ESAs are notified by MOEF as per the powers granted to it under the section 3 of the Environment (Protection) Act, 1986 and section 5(1) of the Environment (Protection) Rules, 1986. The ESAs that have approached MOEF are Matheran, Dahanu and Mahabaleshwar-Panchgani. For the past few years, MOEF has been under pressure to open up ESAs for 'development' purposes (see 'Black attack', *Down To Earth*, December 15, 2004). ■

Saving the bobolink from extinction

JIM GILBERT

Wages of protection

Wildlife habitat conservation in US town compensated

COMPENSATING people for conservation is happening at a regional scale. Local residents of Jamestown in Rhode Island, US, are paying farmers to delay haying their fields until after birds have completed nesting.

Experts claim it as a unique test to establish investment markets for ecological services. The compensation is meant to protect habitat for bobolinks, a grassland-nesting bird whose population is declining in New England.

Early hay

Hay is grown for livestock and can be harvested twice a year and the first one (during May-June) usually interferes with nesting of bobolinks. Bobolinks nest in undisturbed hayfields during March-April. "Changes in climate have caused farmers to harvest hay earlier over the years, cutting into the bobolinks' nesting patterns and leading to a decline in the birds," says Stephen Swallow, professor of environmental economics at the University of Rhode Island (URI).

The mowing machines destroy the birds' nests, eggs and young. The researchers found that delaying the harvest provides sufficient time for birds to mature and flyaway. "For that, farmers needed compensation as cost of delaying the harvest and purchasing replacement hay. By doing so, birds could be easily saved without negatively impacting the farmers," said Swallow.

"The Jamestown residents and farmers for the first time experimented to use a market approach to enhance ecosystem services," says Emi Uchida, assistant professor at URI. "Ecological markets are a way to correct such environmental problems by enabling businesses and individuals to express their values and invest in the environment," said Swallow. ■

UPDATE

Russia may lift the ban on exports of rice, groundnut and sesame seeds from India soon. The ban was imposed in April after Russia's monitoring agencies claimed to have found a pesticide, dimethotate, which is not allowed under Russian laws (see 'Russia outlaws Indian rice' *Down To Earth*, June 30, 2007). India and Russia signed a protocol on export of rice earlier this week in Moscow wherein India assured that future consignments will be free of contamination. The Russian government has promised India that the lifting of the ban on the three products will be announced shortly.

Indian bamboo on its way to Africa

ARVIND YADAV / CSE

High demand

For Indian bamboo

AMARJYOTI BORAH *Guwahati*

INDIAN bamboo is in high demand in countries like Kenya and Ethiopia. Kenya has asked for 50 kg of bamboo seeds from India, which is likely to go up in future. The species—*Melocanna baccifera*, *Dendrocalamus asper* and *Bamboo bambusa*—suit climate requirements in the two countries. The destruction of forests the worldover is alarming. But this is where bamboo can help.

"A bamboo matures in just four years whereas other trees take almost 30-40 years to mature. With a receding forest cover, increase in demand for bamboo for various uses is a positive sign," says Kamesh Salam of the Cane and Bamboo Technology Centre, Guwahati. "Another species *Bambusa balcooa* is strong and can be a good replacement for wood, and *Bambusa Tulda*, another variety, is soft, which is popular among artistes," says Y C Tripathi of the Rain Forest Research Institute, Jorhat. Bamboo is also well known for its edible shoots. "Currently, only few groups from countries like Thailand are dominating the edible shoots market, but with time even countries like India and Kenya will also catch up," says Pranab Saikia, who runs Luit Valley Food Processing (P) Ltd, the first edible bamboo shoot processing plant in India.

India is the second richest country in terms of bamboo genetic diversity with a total of 136 species under 75 genera. It has about 8.96 million hectares of forestland, which is equivalent to 12.8 per cent of the total forest cover in the country. Almost two-thirds of the bamboo resource of India is from the northeast. The raw stock in the northeast is valued at Rs 5,000 crore and utilisation of even about 25 per cent can generate Rs 2,500 crore a year. Bamboo offers opportunities for employment and income generation. Over 1,500 uses of bamboo's have been recorded till date. ■

Monsoon misery

Flood-fury in Rajasthan again

RAINS caused widespread destruction in Rajasthan's Jodhpur, Pali and Banswara districts, claiming more than twenty lives in the first week of July. Last year too the showers wreaked havoc in the drought-hit state (see 'Heavy weather', *Down To Earth*, September 30, 2006). Mount Abu, the highest peak in the Aravalli Range recorded a maximum rainfall of 124 mm on July 10.

Heavy inflow of swollen rivers breached the 118-year-old Jaswant Sagar Dam in Jodhpur after being fed by swollen rivers, transforming a part of the desert into a lake. The irrigation department has initiated repair work of the dam. Nearly 50,000 people marooned in about 50 villages in Jodhpur and Pali districts were evacuated. According to some of the affected villagers, no action had been taken even after they complained of cracks developing in the dam and its supporting wall. The district administration, however, denied the allegations and maintained that people in the affected areas did not cooperate with them. ■

Luxury called food

Food-aid comes a cropper

THE central government's food assistance schemes haven't worked. The 61st round of the National Sample Survey Organisation (NSSO) report on Public Distribution System and Other Sources of Household Consumption, 2004-05, shows that only 28 per cent of the rural poor have benefited from any such scheme. For urban areas, the figure is at 9.5 per cent. The worst hit are the poorest who own less than 0.1 hectare. For them, most schemes haven't worked.

The aim of such schemes was to reduce food insecurity among the poor and to target malnutrition among children. And these have been in place for long. For instance, the Food for Work (FFW) and Annapoorna have existed since 2000 and Integrated Child Development Scheme (ICDS) since 1975. FFW has been replaced by National Rural Employment Guarantee Act, 2006 and the others, including Midday Meal, continue. Given that the funds allocated for the Midday Meal Scheme is Rs 7,324 crore and budgetary allocation under ICDS have been increased from Rs 4,087 crore in 2006-07 to Rs 4,761 crores in 2007-08, the survey report presents a dismal picture.

According to the report, the Midday Meal scheme benefited children from 22.8 per cent rural households, compared to ICDS that could reach 5.7 per cent households, FFW 2.7 per cent and Annapoorna, a measly 0.9 per cent. ■

Government-run food assistance schemes haven't met their objective of providing food to the poor, or treating malnutrition in children

Dead end on how to rehabilitate

Group of ministers' meeting fails to reach consensus

SUPRIYA SINGH

THE draft Resettlement and Rehabilitation Policy has hit a roadblock for the second time. The group of ministers (GOM) debated the draft policy brought out by the Union ministry of rural development (MORD) on July 3, after failing to reach consensus the first time on June 20. The problem areas are compensation and land acquisition.

The proposed compensation package prepared by MORD gives landless labourers the position of equivalent beneficiaries as land owners. The proposal hasn't gone down well with GOM. On land acquisition, while industry wants the government to acquire land directly for development projects, MORD proposals in the draft aim at nullifying the government's role completely in land acquisition.

The second meeting was kept private and media kept at bay. "Why the secrecy? Why shouldn't rehabilitation be discussed with people?" asks Himanshu Thakkar of South Asia Network on Dams Rivers and People. Agrees social activist Medha Patkar. "There is no transparency in the process and no room for negotiation. The national policy should focus on development planning with land acquisition being just a part of it but at the moment it seems like the focus is mainly on acquiring land," she said.

The talk of "single window clearance to projects" with respect to the finance minister P Chidambaram's stand in the first meeting is being seen as 'pro-industry'. "It appears as if the finance ministry is treating MORD as a peripheral ministry. They seem to be just pushing their projects ahead (at the behest of the industry), rather than consulting with MORD," says Patkar. Souparno Lahiri of India Forum says displacement is an issue. "Why have projects in high-density areas?" he asks.

The draft resettlement and rehabilitation policy has always been under scanner (see 'Centre's new draft rehabilitation policy half-baked', *Down to Earth*, November 15, 2006). ■

Partial fix

Report on vital water issues

"BOTTLED water and soft drinks industry should be charged higher water-cess". This was among a series of recommendations issued by a sub committee to frame a water policy for industries. The sub committee was formed by the groundwater recharge council.

The sub-committee stresses on the importance of locating industries based on their consumption capacity and water availability. The report has also recommended that rainwater harvesting be made mandatory within the catchment, upstream of industries, in addition to within factory premises. On water cess, the report also recommends that cess should be collected based on water use.

Other recommendations include ban on injection of treated wastewater into the ground, water audit for industries and incentives for those practising recycling. Criticising the uniform groundwater regulation policy, which is not eco-region specific, the report says regulations should become more stringent in regions with low rainfall compared to those with high rainfall. It is, however, silent on groundwater impact assessment involving the public. ■

UPDATE

The Supreme Court's Central Empowered Committee, on July 18, asked the Sikkim government to respond to allegations made by the Lepcha community in Sikkim. On July 17, Lepcha tribesfolk who are opposing big dams in Sikkim under the banner Affected Citizens of Teesta (ACT), had approached the committee stating that the proposed 280 MW Panang hydel project in the Dzongu Lepcha Reserve had received environmental clearance from the Union ministry of environment and forests, even though part of the project encroached on the Kanchendzonga National Park. A 1995 Supreme Court ruling prohibits such activities within national parks and sanctuaries. The committee has sent a letter to the state government asking its views on the matter. Meanwhile, ACT members have been on an indefinite hunger strike since June 20 demanding plans of six mega hydel projects (including Penang) in the protected Lepcha reserve be scrapped (see 'Dammed lot', *Down To Earth*, July 31, 2007).

An old woman joins ACT members at their indefinite hunger strike

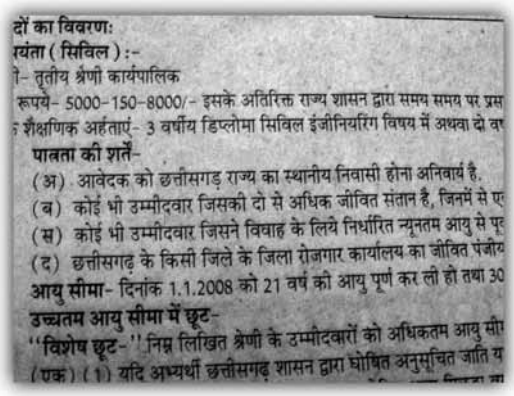
KARCHOONG DIYALI

Chhattisgarh government's baby talk

Advertisement for sub engineers follows two-child norm

A RECENT full-page advertisement by the Chhattisgarh government for the post of 129 sub-engineers has left prospective applicants shocked because of three conditions tagged with it. One, an applicant should not have more than two children. Two, the elder child should not be more than six years old. Three, the applicant should not have married prior to the official marriage age—21.

Government ad outlining conditions for job


दों का विवरण:
यंता (सिविल) :-
ी- तृतीय श्रेणी कार्यपालिक
रूपये- 5000-150-8000/- इसके अतिरिक्त राज्य शासन द्वारा समय समय पर प्रस
शैक्षणिक अर्हताएं- 3 वर्षीय डिप्लोमा सिविल इंजीनियरिंग विषय में अथवा दो व
पात्रता की शर्तें-
(अ) आवेदक को छत्तीसगढ़ राज्य का स्थानीय निवासी होना अनिवार्य है.
(ब) कोई भी उम्मीदवार जिसकी दो से अधिक जीवित संतान है, जिनमें से ए
(स) कोई भी उम्मीदवार जिसने विवाह के लिये निर्धारित न्यूनतम आयु से पू
(द) छत्तीसगढ़ के किसी जिले के जिला रोजगार कार्यालय का जीवित पंजीय
आयु सीमा- दिनांक 1.1.2008 को 21 वर्ष की आयु पूर्ण कर ली हो तथा 30
उच्चतम आयु सीमा में छूट-
"विशेष छूट-" निम्न लिखित श्रेणी के उम्मीदवारों को अधिकतम आयु सी
(एक) (1) यदि अभ्यर्थी छत्तीसगढ़ शासन द्वारा घोषित अनुसूचित जाति य

However, no one seems to know about the conditions imposed. "I don't know anything about this," says P P Soti, director of the panchayat and rural department, which published the ad. Arun Kumar, assistant director of Chhattisgarh Professional Examination Board, who issues such advertisements, says the advertisement was in accordance with a central government rule but didn't know what the rule was. ■

How potent?

Row over polio vaccine

VIBHA VARSHNEY

THE polio vaccine administered at present may be unsafe. There is a controversy brewing over its potency. Experts in India say that the monovalent oral vaccine (mOPV1) is being used without assessing its safety. It was introduced in the country in 2005 after it was given a fast track licence by the drug controller general on the premise that the same vaccine was used in the 1960s. Before 2005, the trivalent vaccine was in use.

A paper published in *The Lancet* says the vaccine is five times more potent than the one developed in 60s. The paper is authored by Nicholas Grassly of London's Imperial College and co-authors include experts from WHO and the National Polio Surveillance Project in India who are part of India Expert Advisory Group (IEAG). The polio programme is implemented by the government under directions from WHO's Global Polio Eradication Initiative. IEAG has experts from international agencies, including WHO, take decisions on vaccines. The study has drawn sharp reactions from Indian scientists. They say that IEAG misled them into believing that mOPV1 was the same vaccine that was used in the 60s without being told of its higher potency. They are concerned because the increased potency could lead to further adverse impacts. There is evidence to show that oral polio vaccine can increase the incidence of non-polio related paralysis.

"No informed consent was taken, nor was the public told that the vaccine was experimental," wrote Jacob Puliyel of St Stephens Hospital, C Sathyamala of Council for Social Development and D Banerji of Centre for Social Medicine and Community Health, Jawaharlal Nehru University, in response to the study. Replying to their concerns, Grassly along with the co-authors said they had not misled and that the vaccine was approved by the drugs controller general. Grassly feels that there is little cause for concern on adverse impacts of mOPV1 because it has the same potency as the trivalent vaccine, while accepting that the monovalent vaccine of 1960s was of lower potency. ■

IN SHORT

EU DUMPING RULES: On June 12, European Union (EU) laid down rules to check illegal dumping of hazardous materials in developing countries. An update of 1993 EU regulations, the new rules require EU governments to carry out inspections and make spot checks of ships in their territory. It also gives governments the right to check containers for their contents and lays out rules for shipments within the EU. For example, the new rule entails that detailed information should be presented with respect to hazardous waste.

NEW FOOD STANDARDS: On July 9, the Codex Alimentarius Commission, a UN body on food standards, adopted more than 50 new safety and quality standards, new guidelines, and some revisions of old standards. It revised hygiene rules for eggs and egg products in order to check diseases and plans to develop more guidelines for making bacterial contamination in chicken less frequent. It will assess risks to consumers from foods derived from biotechnology, including genetically modified foods, and irradiated products.

WETLANDS IN JEOPARDY: New guidelines issued by the US Environmental Protection Agency and the Army Corps of Engineers on June 5 say that for non-permanent streams and nearby wetlands to be protected there must be a "significant nexus" between the intermittent stream or wetland and a traditional waterway. Environmentalists claim the guideline, decided after much lobbying by property developers, mine owners and farm groups, will jeopardise many intermittent streams and headwaters under the Clean Water Act, 1977. They contend that it will result in less protection of wetlands. It would negate the broader regional importance of many such waterways in the aggregate on water bodies downstream, they said.

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Cross border bustle

Stop order on Meghalaya-Bangladesh limestone traffic

MAUREEN NANDINI MITRA *Shillong*

French multinational Lafarge's limestone quarries in Meghalaya, which supply raw material to its cement plant across the border in Bangladesh have been shut down by the government. This comes nearly a year after an official of the Union Ministry of Environment and forests (MoEF) found that the mining lease area was forestland. The official had also found that environmental consultants and a local forest official had given false information about the nature of land to ensure clearance of the project.

The temporary closure order, issued on April 30, 2007, is a major setback to India's first sub-regional private sector project under the much-hyped Look East Policy. The Indian half of the venture was already mired in controversies related to acquisition of tribal lands and subsequent mortgage of those lands to foreign banks in Bangladesh.

Limestone dependent

The project involves mining and transport of limestone from Shella-Nongtrai villages in Meghalaya's East Khasi Hills district to a cement plant in Chhatak, Bangladesh (see map: *Limestone travails*), via a 17 km-long cross-border conveyor belt. The US $225 million, state-of-the art plant, Lafarge Surma Cement, depends entirely on limestone from Meghalaya's quarries. The project, initiated in 1997, plans to produce 1.2 million tonnes of cement annually. The plant started producing and selling cement in 2006.

The quarries, which are about 100 km from Shillong, are operated by a subsidiary of Lafarge Surma, Lum Umiam Mining Pvt Ltd. The mining rights, however, are owned by another Lafarge Surma subsidiary—Lum Mawshun Minerals Pvt Ltd. Mawshun has a 35-year lease agreement with the villages for about 100 hectares (ha) for the mines and the liberty to use another 26.6 ha for mining-related activities. Lafarge Surma owns 74 per cent of this company and the remaining is owned by two Khasi tribesmen.

The deal

India and Bangladesh signed an agreement for uninterrupted supply of limestone to the Chhatak plant in 2001, following which the company obtained environmental clearances from MoEF and other state bodies. But it now appears these clearances were obtained on the basis of misleading descriptions.

In a certificate dated June 13, 2000, Khasi Hills' divisional forest officer wrote: "the proposed...site for Limestone Mining Project at Phlangkaruh, Nongtrai, East Khasi Hills District, Meghalaya leased out by the Lum Mawshun Minerals Pvt. Limited, is not a Forest area as per Supreme Court judgment and does not fall under...notified Reserved or Protected Forests". Similarly, Environmental Resources Management India, a Delhi-based company that prepared the rapid environment impact assessment for Lafarge, described the project site as an area of "uneven terrain with a rugged topography" where "the terrain undulation and the rock texture do not allow normal plant growth". It further said: "This is an area of low botanical and floral diversity. Covered with rocks and debris, this area can be termed as a near wasteland."

But B N Jha, former chief conservator of forests, Meghalaya, who brought the violation to light last year, rubbishes this report. Jha, who's since been transferred to Patna, visited the area on May 24, 2006 and discovered the mining site was surrounded by thick natural forests. He found that about 20 ha (already mined) was strewn with tree trunks, while the remaining unmined area had stretches of natural forest with tall trees and dense vegetation. "You don't need to be an expert to see that it's forestland," he said. Jha then apprised MoEF of the matter. According to the Forest Conservation Act, 1980, any project using forests for non-forest purposes needs to obtain a forest clearance from the central government. And a 1997-Supreme Court order says that it includes any land that fits the dictionary meaning of the word forest, irrespective of who owns the land. Clearly, the company had violated the act.

But the ministry failed to take any action then. On April 9, 2007, Jha shot off another letter to MoEF stating his case. He said the division forest officer had "falsified the facts probably intentionally to effect exemption of land

Mining area is lush forest

PHOTOGRAPHS: RITWICK DUTTA

A 17 km conveyor belt transports limestone mined in Meghalaya to the Bangladesh factory

from the clearance and provide unjustified escape for the company". He also recommended that Environmental Resources Management India be blacklisted for fudging reports and misleading the government. Following this, MOEF sent Lum Umiam Mining Pvt Ltd a stop-work order and asked the company to apply for fresh clearances under the Forest Conservation Act, 1980.

Lafarge has challenged the order in the Supreme Court claiming it had not sought forest clearance as the mining area had been certified as "not falling under forest area" by the state and the Khasi Hills Autonomous District Council (responsible for monitoring land use and clearing projects in the Schedule VI districts of East and West Khasi Hills). The company also sought permission to transport 600,000 tonnes of already-extracted limestone lying at the quarries to its Bangladesh plant, in view of the current monsoon season.

The Supreme Court has, for the moment, upheld the MOEF order and referred the matter to its Centrally Empowered Committee—that investigates encroachments on forestlands. It hasn't given Lafarge interim permission to transport the already-mined limestone. Meanwhile, district council chief executive H S Shylla says the council and the state government were conducting separate inquiries to find out who was responsible for clearing the project.

Double whammy

There's more, however, to Lafarge's current cup of woes. A petition filed on May 17, 2007 by Shella Action Committee, comprising a group of Shella residents, has questioned the legality of the process through which the company's Megahalaya-based subsidiaries acquired land in their village and then used it as security for a US $153 million loan from seven major foreign banks to build its plant in Bangladesh. (The banks, all of which are based in Bangladesh, include the Asian Development Bank, the International Finance Corporation, European Investment Bank, Arab-Bangla Bank and Standard Chartered Bank of Bangladesh).

Fourteen other respondents cited in the petition include the state government, the Union ministries of home, finance, forests, the national commission for scheduled tribes and the Reserve Bank of India. The litigants accuse them of dereliction of their constitutional duty to protect tribal lands and environment from local and foreign incursions. Yet another petition by a group of 10 landowners of Shella and a neighbouring village, Tynger, alleging illegal acquisition and encroachment on their lands by the mining company, has been listed.

Apart from 100 ha for the mines, the company also bought 40 ha from 87 Shella villagers and leased another 3.6 ha from two villagers for its conveyor belt. These lands are protected for Khasi tribes under Schedule VI of the constitution and the Meghalaya Transfer of Land Regulation Act 1971 and their transfer to non-tribals is prohibited. But the state government had, in 2001, relaxed the provisions of the Meghalaya Land Transfer Act enabling Lafarge to acquire the land. Shella Action Committee lawyers say the acquisition violates the local land tenure system.

"The land transfer is illegal and unconstitutional," says advocate B M Roy Dolloi of the action committee. "Besides, a company in Bangladesh will mortgage our lands for loans, is it proper? If it defaults on the loan then Indian land will become Bangladesh's. Indian foreign policy with China and Pakistan categorically says 'not even an inch of Indian soil will be given'. What about this land then?" asks Dolloi.

Lafarge officials in Shillong, however, dismissed these allegations saying that the land had been acquired legally and with government sanction. State government officials say the mortgage doesn't pose a threat to the interests of the nation. The high court, meanwhile, has given an interim order banning the company from taking fresh loans by mortgaging tribal lands in the state and asked all respondents to file affidavits explaining their actions. ■

Limestone travails

Meghalaya mines, Bangladesh plant

WHO MOVED MY LAND?

Orissa tribals fight to get cashew rights back

PHOTOGRAPHS: ASHUTOSH MISHRA

ASHUTOSH MISHRA *Koraput*

"I have no choice but to leave my village in search of work. Otherwise, my family will starve," says Samra Malik of Malikput village in Orissa's Koraput district. He, and several others landless like him, go to work on railway construction sites in Andhra Pradesh and coastal Orissa. Malik alleges that a state body does not allow them to grow cashew leaving them with no other option.

Malikput and 21 other villages under the Machkund tehsil comprise the largest cashew growing belt in Koraput. There have been constant conflicts between villagers who say that the cashew growing land belongs to them, and the state body—Orissa State Cashew Development Corporation—which calls the villagers 'encroachers'. The 'encroachers' say cashew brings in money and offers them hope of a better future without having to leave their villages. "One acre of cashew, if the harvest is good, fetches us anything from Rs 5,000-6,000," says Bhakta Ram Pangi of Harganda village.

Villagers firm

The conflicts, however, have assumed a war-like situation at present, with no signs of truce. "For years, we have been nurturing and protecting these plantations. How can we hand it over to traders who have got leases from the corporation by paying money?" asks Malik. Few months ago, the supervisor of the corporation visited Harganda and Malikput and threatened people with police action if they refused to leave the plantations. The cashew development corporation has been leasing out cashew plantations in different parts of Koraput for harvesting on a yearly basis through open bidding since 1979. However, it is only recently that protests have become more organised and people have stuck to their claims. "The corporation calls us encroachers but we know we have a right to this land because our forefathers once ploughed this soil. We have been threatened with police action and cases but we have no intention of leaving," says Mangu Khora of Kanta, among the 22 villages protesting.

"One acre of cashew, with good harvest, fetches us anything from Rs 5,000 to 6,000."

BHAKTA RAM PANGI

In Mamatpur, women have been guarding the hill slopes. They are protesting under the banner Dangar Adhikar Samiti. "This year, the cashew corporation has given the lease to Upapada, a non-tribal," says Damuni Khilo, leader of the village's women brigade. "He had come to stake his claim in May last year but we refused to let him in. He filed a complaint with the Machkund police but when the policemen came we chased them away. So far, there has been no case against us but we are expecting them to file one anytime. In any case, we are not going to leave our plantations," she says.

Spice of contention

Cashew grows in 22 of the 30 districts in Orissa. Its main concentration has been in

Koraput where the soil conservation department took it up in the mid-50s. It checked soil erosion in dam areas like Machkund and Kolab. Plantation was then taken up on a massive scale in a phased manner under different government schemes like Economic Rehabilitation of the Rural Poor, Integrated Tribal Development, Employment Assurance Scheme and Jawahar Rojgar Yojana.

Local communities engaged in the protection of these plantations had hoped that the plantations, most of them being close to their villages, would be given to them. But their hopes were dashed when the Orissa State Cashew Development Corporation was formed in 1979 and the soil conservation department was asked to handover the plantations to the corporation, which has ever since leased out cashew orchards through tenders. The corporation, at present, has about 4,047 hectares under its control. This has tilted the scales against tribals who have not been able to adapt to leasing and tenders due to a lack of understanding of the process. Barring a few like Lobo Matam of Godiput village, who got the lease from the corporation for five years in a row from 2000-2001, the tenders have generally been cornered by well-to-do traders from Jeypore and other parts of Orissa.

"For years, we have been nurturing and protecting these plantations. How can we hand it over to traders who have got leases by paying money?"

SAMRA MALIK

Matam, who stopped bidding following protests from villagers, who insisted that they would collectively harvest cashew, claims there have also been instances of traders 'using' tribals to obtain leases. "With stiff resistance from villagers, traders have tried to obtain leases by offering us money. But we have consistently refused," says Matam.

Documentation, or no?

Bhimsen Sabar, former *tehsildar* of Machkund, had issued *pattas* (deeds) for harvesting cashew to around 1,500 people in different villages in Machkund between 2004 and 2005. But the present administration has refused to recognise the *pattas* citing irregularities in their issuance. While Sabar was transferred soon after the controversy, people are not ready to buy the present administration's argument. "All this is being done keeping in mind the interests of the cashew corporation. If we are allowed to retain the *pattas*, it will only harm the corporation," says Sukhram Gadanga, president of Machkund Vaschyut Mahasangh, another outfit fighting for plantation rights.

Present *tehsildar* Chandrasekhar Mohapatra says the *pattas* were issued irregularly without demarcating land. "When we issue *pattas* we make due inquiry about the social and financial status of the prospective beneficiaries before preparing the list. The land, too, is surveyed for its quality before demarcation but nothing of that kind appears to have happened in this case. The *pattas* were issued at random. Besides, we are unable to find any records in our office," says Mohapatra who claims he is making personal efforts to collect copies from people. "So far, I have collected 800 copies. It's a difficult task but I am still doing it for people's sake because I want to be sure about the genuineness of their claim," he says.

But people are sceptical of such moves and say that some of them may not have *pattas*, yet own the land. "The land belongs to us though we may not have *pattas* to back our claims. When land settlement took place in Orissa in 1961, our predecessors may have failed to stake claim due to their ignorance. If they had approached the authorities they would have got the *pattas*. They perhaps thought there was little need of it because they had been using the land for generations," says Budhu Dantu from Harganda.

Mohapatra says such claims are only partly correct. "It is true that tribals may have failed to claim because of ignorance. But it is wrong to say that none of their claims were registered," he says, adding that tribals were now also staking claim to the cashew growing on the hills, which is government property. "How can somebody claim a hill to be his own?" asks Mohapatra.

Outlawed

Pramod Kumar Routray, assistant in the cashew development corporation's Lamtaput unit, rubbishes claims of the tribals as propaganda. "They are being incited by organisations like Dangar Adhikar Samiti and other local NGOs. Pressures on people who have obtained leases by paying money are unwarranted. The money will go into government treasury," says Routray.

But people like him have not taken into account the fact that Koraput falls under Schedule v of the Indian Constitution and that the Panchayat (Extension to Scheduled Areas) Act is implementable there.

The laws make it mandatory for local *gram sabhas* to be consulted with regard to any kind of cultivation in and around villages which people claim to be their common property resource. However, Laichan Badnaik, *sarpanch* of Chickenput *panchayat* under Lamtaput block, says no attempt has ever been made to take the consent of *gram sabhas* for leasing of cashew plantations.

Villagers have let it lie for long. But not anymore. Badnaik says what tribals want will prevail. "We need to win this war over the cashew corporation." ■

Orissa State Cashew Development Corporation has 4,047 hectares of plantation area under its control. But tribals don't have the rights to grow cashew

BULB OF CONTENTION

CFLs score over normal bulbs, mercury the only sore point

SHYAMAL

SUJIT KUMAR SINGH

If households in Delhi replace four ordinary bulbs with four compact fluorescent lamps (CFLs), their annual savings would be around Rs 273 crore. Startling figure. The highly energy inefficient incandescent light bulb is on its way out. Replacing it is the new-generation and more energy-efficient CFL (see box: *Energy efficient*). Brazil and Venezuela initiated the process of phasing out incandescent bulbs. Australia plans to do it by 2010 and Canada by 2012. Other countries—New Zealand, Netherlands, US—are also planning to phase out incandescent bulbs.

In India, however, there is no formal plan to phase out ordinary bulbs yet. There is a debate over the amount of mercury that CFLs may emit and concerns regarding its disposal. But pro-CFL groups say that mercury emissions from thermal-based power plants are much higher, compared to CFLs, and hence, the fears are unfounded. And, given the power crisis in the country, it is only feasible to convert to CFLs (see box: *Advantage CFL*).

Toxic mercury

CFLs contain small amount of mercury—about 3-4 milligramme (mg). While mercury gives the CFLs an added glow, it is also toxic. High levels of mercury intake can damage the brain, the reproductive system, foetuses and cause behavioural problems. It has a tendency to bio-magnify in natural conditions.

However, there are advantages because CFLs help in curbing greenhouse gases (see table: *Environmental pollution and resource consumption*). Hence, the question that emerges is how will CFLs impact the environment after they exhaust 7,000 hours of life? Calculations prove that mercury emission from CFLs will be 4.32 times lower than incan-

Energy efficient

CFL consists of a long glass tube fitted with electrodes. The tube is filled with mercury vapour and gas (argon or xenon). The glass tube's interior is coated with phosphor. When electricity is supplied, electrons are released from the electrodes, which excite the mercury atoms causing them to emit ultraviolet (UV) light. The UV light gets absorbed by the phosphor and reradiates the energy in the form of visible light. Since no heating is involved, a fluorescent lamp requires only about 20 per cent of the electrical energy used by an incandescent bulb to produce the same amount of light. In incandescent bulbs, 90 per cent of the electrical energy supplied goes waste as heat rather than light energy.

Saving grace

If all households in Delhi replace 4 ordinary 60-watt bulbs with 4 CFLs of 15 watt, the annual saving of resources and reduction in pollution load will be as follows:

- **Saving of electricity – 757 million unit (1 units is equal to 1kWh)**
- **Amount of money saved – Rs 273 crore**
- **Quantity of coal saved – 5.4 lakh tonnes**
- **Reduction in flyash – 1.9 lakh tonnes**
- **Reduction in greenhouse gases (CO_2) – 7.55 lakh tonnes**
- **Reduction of sulphur dioxide – 5,469 tonnes**
- **Reduction of Oxides of nitrogen – 356 tonnes**
- **Reduction in particulate matter (dust) – 2,272 tonnes**
- **Water saving – 4,052 million litre per year (equivalent to 11 mld water per day)**
- **Reduction in Mercury – 136 kg per year**

Note: For calculation 28.82 lakh households have been considered
Source: Industry and Environment unit, Centre for Science and Environment, New Delhi

ADVANTAGE CFL

CFLs are energy efficient. And the saving potential is immense

	100 Watt incandescent bulb	20 Watt CFL
Power consumption per hour	100 watt	20 watt
Total power consumed in 1000 hour	100,000 watt	20,000 watt
Total electricity consumed in 1,000 hour (1 unit = 1,000 watt)	100 units	20 units
Assume electricity rate per unit is Rs 4, then total cost of electricity consumed in 1,000 hour	Rs 400	Rs 80
Money saving in 1,000 hour	Rs 400 – Rs 80 = Rs 320	
Money saving in 7,000 hour by saving electricity	Rs 320 x 7 = Rs 2,240	
If average cost of CFL is Rs 150 and runs for 7,000 hr, it means 7 ordinary bulbs are required to replace one CFL	Assume the cost 100 watt bulb is Rs 12, then cost of 7 bulbs Rs 12 x 7 = Rs 84 Assume cost of 1 CFL bulb is = Rs 150 x 1 = Rs 150 Difference = Rs 150 –Rs 84 = Rs 66	
Net saving of money from 20 watt CFL in 7 year including all charges	= Rs 2,240 – Rs 66 = Rs 2,174	

Environmental pollution and resource consumption

	Comparison of resource consumption and pollution potential of incandescent bulb and CFL for running 1,000 hour	
	100 Watt incandescent bulb	20 Watt CFL
Coal consumption	71 kg of coal consumed for running 1,000 hr	14.2 kg of coal consumed for running 1,000 hr
CO_2 emission	99.7 kg of CO_2 released	19.94 kg of CO_2 released
SO_2 emission	722 gram of SO_2 released	144.4 gram of SO_2 released
NOx emission	47 gram of NOx released	9.4 gram of NOx released
Particulate matter	300 gram of particulate matter	60 gram of particulate matter
Fuel oil	260 ml of fuel oil consumed	52 ml of fuel oil consumed
Water consumption	535 litre of water consumed	107 litre of water consumed
Fly ash generation	25 kg of ash generated	5 kg of ash generated
Mercury emission	18 milligramme of mercury generated	3.6 milligramme of mercury generated

Note: Average life of an ordinary bulb and CFL are around 1,000 hour and 7,000 hour respectively.

4.32 times lower

	100 watt incandescent bulb	20 watt CFL
Total electricity consumed in 1,000 hr	100 kWh	20 kWh
Assuming mercury emission is 0.18 mg for generating per kWh, then total emission of mercury in 1,000 hour	18 milligramme (mg)	3.6 mg
Assuming 7,000 hour is the life of CFL bulb. It means 7 ordinary bulbs are required to replace one CFL. Then total mercury emission in 7,000 hour	18 mg x 7 = 126 mg	3.6 mg x 7 = 25.2 mg Average mercury content in CFL bulb is around 4 mg, total emission of mercury in the entire lifespan of CFL = 25.2 mg + 4 mg = 29.2 mg

Note: Considering if electricity is supplied to incandescent bulb from coal-based thermal power plant.
Source: Industry and Environment unit, Centre for Science and Environment, New Delhi

descent ones, considering if electricity is supplied to incandescent bulbs by coal-based thermal power plants (see table: *4.32 times lower*). No laws for disposal and recycling of CFLs, however, makes it tough. Given the scenario, there is the possibility of mercury spreading in the atmosphere. Coal-based thermal power plans also emit mercury—about 65 tonnes on an average through combustion of coal annually.

The emission of mercury from coal-based power plant, however, is point source (through chimneys). But controlling emissions from diffused sources (uncontrolled and random dumping) like CFL is a more difficult task. And it is anticipated that as the CFL-use goes up, the problem will assume alarming proportions. The solution, experts say, is to frame strict laws, give incentives for recycling and have buy-back policies in place. There should be written instructions on precautionary measures and ways of using and disposing CFLs.

Technology exists to segregate glass, phosphor powder, mercury and other materials from expired CFLs. Canada, for instance, has recycled 7 per cent of fluorescent bulbs. To reclaim mercury from fluorescent tubes, the tubes are placed on conveyer belts and crushed in a crusher. Then, after a series of stages, mercury is baked in a vacuum oven for up to 12 hours. It is then cooled, collected and sent for purification.

High production

Despite the constraints, CFL production in India is on a high. Production has increased from 6.4 million to 44 million in 2005-06. It is estimated that India will save around 12,000 MW and reduce CO_2 emissions by 4 per cent. According to Greenpeace, "if all regular bulbs in India were to change to CFL, 55 million tonnes of carbon emissions could be avoided", which is equal to 30 per cent of the emissions of all vehicles in India.

According to Delhi's electricity provider, BSES, around 400,000 CFLs have been distributed under the 'buy one, get one free CFL' scheme. Delhi has saved 25 MW. The scheme stared in October 2006. According to estimates, Delhi could save around 450 MW if ordinary bulbs are replaced by CFLs. Not much reason why the rest of the country shouldn't follow the example, but with a proper disposal mechanism in place. ■

DARK ESSENCE

SAMRAT MUKHERJEE / CSE

Vanilla is said to be the world's most popular flavour. As much as 40 per cent of the world's ice cream is vanilla flavoured. Its sweet, mildly fruity, spicy and alluring aroma is considered to be both sensual and calming. Aroma analysts call vanilla the smell of love. Others describe vanilla as good business because it sells millions of dollars worth of cakes, perfumes, cosmetics and many other things nice.

Vanilla is driving farmers of Kerala mad as well. But not with ecstasy. They are worried because this is the time they harvest pods of vanilla beans on their farms. But this is also the time when they do not get the price for their labour. The problem, they say, is that the ice cream we eat as vanilla is not vanilla, it is synthetic vanillin extracted from effluent waste of paper mills or even coal tar. But this synthetic product has taken over the vanilla industry. The farmers blame the government for promoting vanilla plantation but not securing the use of their plant in food. Industry says the synthetic fake is good enough. It is also cheap. Why then should they go for the original bean?

In all this, prices have crashed. Vanilla farmers are close to bankruptcy. ARNAB PRATIM DUTTA *travels to the farms of Kerala to find exactly what is rotten in the business of this sweet smelling spice.*

ARNAB PRATIM DUTTA / CSE

BEAN STALK

Trailing the vanilla trade

Jacob Sebastian no longer wants to invest in his vanilla plantation. He still has more than 1,000 vanilla plants intercropped in his half hectare (ha) rubber plantation in Kerala's Kottayam district. But this year he did not hand-pollinate these plants so he does not expect a crop. In a nearby plantation, P J Joseph uprooted 1,250 plants that grew on one-third of his 1.2 ha farm. Joseph is now planning to grow only rubber in this area. In adjoining Eranakulam district, Ibrahim, a small-time farmer, has removed all his vanilla plants from 0.8 ha of his coconut plantation.

The story repeats in other parts of Kerala as well. Farmers say the business of vanilla has let them down. The crop is highly labour-intensive and takes time to flower, the seed takes even longer to cure. It's literally a labour of love. Vanilla does not self pollinate. In nature, vanilla is only pollinated by the Mexican bee and humming birds. But these are found only in Mexico and all attempts to make them work in other regions have failed. Farmers have to 'manually' pollinate the flower. But the flower of vanilla lasts about one day, sometimes even less, so farmers have to check every day for flowers they can pollinate. Then they use a sliver of bamboo, or a pin or needle or even a toothpick to separate the anther and the stigma and press the anther on the stigma. The flower then pollinates. The bean is born.

This green bean does not have any flavour. It now has to be cured—a time-consuming process taking up to six months. Meticulous management is required to ensure that the flavour is enhanced, without any spoilage. About five to six kg of green beans when processed, give a kg of cured beans. The cured beans can be exported and last for many years.

The final stage is the one in which the vanilla is extracted from the beans. This is a process that has been tightly controlled globally and demands high price. This is when vanilla, the spice of life, is finally ready to use.

But even then, the quality is a matter of science and choice. Vanilla is assessed on the basis of its principal flavour and aroma compound—vanillin. All this, in turn, is influenced by where the bean is grown, how it is grown and cured. Vanilla from Madagascar, the Comores and Reunion islands is called the Bourbon type, which sets the industry's standard for high-end beans. Indonesia, which harvests its beans early, has captured the low quality bean market. But analysts say Indonesian beans are fast catching up in their flavour and quality.

Madagascar is the leader in vanilla, controlling over half the world's market. India made a relatively late entry into world trade but its stock is rising. In 2006-07, India produced 230 tonnes of cured beans, more than 10 per cent of the world production of over 2,000 tonnes of cured beans. This was up from 188 tonnes of cured beans produced in the previous year. This is partly because the crop, which needs three years to mature, is ready for harvest. Kerala leads the production of vanilla beans in India with a share of more than 52 per cent. Last year, Kerala alone produced 122 tonnes of cured beans or close to 660 tonnes of green beans, followed by Karnataka with 88 tonnes and Tamil Nadu with 22 tonnes of cured beans.

Vanilla is not new to India or Kerala. In fact, the English East India Company tried to introduce this orchid in 1830 but the plant died soon after it flowered. The British, competing with the French colonies of Madagascar, then experimented in other states—Assam, Bihar, Tamil Nadu and West Bengal. But all attempts failed.

In the 1990s, when the spices board tried to persuade farmers to take up vanilla cultivation, there were hardly any takers. The reason was that till 1996, the trade and the price of vanilla was tightly controlled through a cartel (known as Univanille) based in Madagascar and so the price remained low and volatile.

5-6 kg of green beans go to make 1 kg of cured beans

By then the market was already segmented. The high-end market was under the sway of Madagascar and Comores, which in the best of times earned between US $60 to US $75 per kg of cured bean. The low quality market was catered to by Indonesian beans, priced between US $20 and US $30 per kg. Other countries, like Uganda, that were not part of any of the groups, earned between US $50 to US $60 per kg of cured beans.

Actually, vanilla prices have never been stable. Market observers talk of the total opacity that characterises the international trade in vanilla. In the 1990s, for instance, Madagascar dictated terms because it had huge stocks of beans. As the demand was more or less fixed, any influx of beans meant a decrease in selling price: in 1997, export prices for 'low quality' Indonesian vanilla went down to as low as US $10 per kg and even bourbon vanilla was selling at a little more than US $15 per kg.

But things changed in 2000. That year, Madagascar was hit by the cyclone Hudah and a severe drought struck Indonesia. Vanilla prices sky-rocketed. By 2002, one kg of cured beans was trading at US $87 and by 2004, the prices of the beans had jumped to US $400. Price of green beans was also up to more than US $50, even though Madagascar stabilised its production by 2004.

Gold rush in India

This high in prices set off a gold rush in India. In 2002, farmers began with incomes of Rs 1,250 for a kg of green beans (against the Rs 50 they are being offered in 2007); by 2003 prices had peaked to Rs 3,500 per kg. P R Muralidharan, treasurer of the Indian Vanilla Growers Association, recalls this heady period: "The news of the failure of Madagascar's crop had spread like wildfire. Farmers saw prices going up. Anticipating even higher returns, they took up vanilla cultivation." The bean was so valuable that farmers hired watchmen, posted guard dogs and even put up electrified fences to guard against thieves. P J Joseph of Kottayam, who made a killing from his one acre vanilla plantation, says he hired guards because, "there were thieves all around who would pluck even the unripe beans. There was no other way to protect this crop which became as expensive as gold".

But the gold rush did not last long. Madagascar and Indonesia revived: beans from these countries were back in

Vanilla flavoured ice cream accounts for over 40 per cent of the sales in the country and this industry is one of the key users of this product

has also withdrawn from the market. "We have been unable to sell most of the cured beans that was procured from Vanilco," says an STCL official, without divulging details about the exact quantity lying with them.

Vanilco is in troubled water. On the one hand, the farmers are demanding money. On the other hand, 15 tonnes of cured beans are lying in its stores with no takers. Now the next harvesting season, starting in October, is around the corner. Vanilco has an outstanding payment of Rs 1 crore to the farmers apart from a bank loan of Rs 1.2 crore. "The farmers want their money back before the harvesting season and then they would also want us to buy their stock for the next year, it's a hopeless situation," says an exasperated Paul Jose, the managing director of Vanilco. "The Union ministry of commerce is responsible for the situation we are in," he adds, pointing to the problems of the use of vanilla in the country.

Story of a cooperative

In 2004, with the market crashing around them, vanilla farmers in Kerala and Tamil Nadu came together with the help of the Spices Board of India to form a cooperative called Vanilla India Producers' Company Ltd (Vanilco). Its members constitute individual farmers and farmers societies who buy beans from smaller farmers and sell it to Vanilco. Currently, this cooperative has 1,600 members who buy beans from almost 25,000 farmers in Kerala and Tamil Nadu.

In 2005, when vanilla was trading in two digits, Vanilco paid a premium price of Rs 250 per kg of green beans and bought 45 tonnes of green beans from farmers. The organisation works on a concept of deferred payment, where they take the stock from the farmer with a promissory note of payment once the stock is sold. The company managed to sell all their stock, their main buyer being the State Trading Corporation Limited (STCL). In this purchase, done under the direction of the Union ministry of commerce, the state corporation bought three tonnes of cured beans (equivalent to 18 tonnes green bean) for Rs 45 lakh at the rate of Rs 1,500 per kg for cured beans.

But by 2006 the trouble got out of hand. Vanilco purchased close to 130 tonnes of green vanilla beans, paying farmers the 2005 price of Rs 250 per kg. But the cooperative has not been able to find any buyers. Their big buyer, STCL

business. Prices crashed like never before. One reason, market observers say, is because the high prices of 2000-2004 scared users of vanilla into switching to the artificial alternative. It was lot cheaper compared to the natural variety and, quite significantly, a lot more stable in terms of price. Vanilla users were loathe to take any chances with a cured bean whose price touched US $400 per kg.

Most Indian vanilla farmers are today told they can sell their produce at Rs 50 per kg. The area under vanilla has gone down: from 5,800 ha in the three vanilla-growing states—Kerala, Karnataka and Tamil Nadu—in 2005 to 5,100 ha in 2006. "Those who took up vanilla farming after 2001 were the worst hit. Expecting high prices in the coming years, many took huge loans to plant vanilla while some borrowed money to secure their farms against thieves," said Muralidharan. "Since vanilla takes three years before it starts to fruit, these farmers could not cash in into the boom and were left with surplus stocks with no takers," he adds.

ARNAB PRATIM DUTTA/CSE

The blame game

Farmers in Kerala are a bitter lot. Much of their ire is targeted at the Spices Board of India, headquartered in Cochin, which they say has let them down. Sebastian, who is also a member of Organic Spice Growers Federation, says "The spices board was busy promoting vanilla as the wonder crop that would make you rich overnight but did nothing to ensure farmers make sustained incomes." Officials of the board, in turn, say that they had warned the farmers of the unusual high prices, but they took no heed.

V S Kurian, chairperson of the board, told *Down To Earth* that he believed vanilla was a profitable crop for farmers even at current prices, because it was cultivated mostly as an inter-crop. However, Kurian's information about the price of vanilla did not match the reality of the current depressed market. He said that the beans were selling at Rs 90 per kg, which was a break-even price.

Vanilla world

Although there are 110 varieties of vanilla, only three varieties are grown on a commercial scale. These include *Vanilla planifolia* also known as the bourbon variety, *Vanilla Tahitensis* or the Tahitian variety and *Vanilla pompona*. *Vanilla plainifolia* is widely regarded as the most commercially important variety due to its strong vanillin content. The Tahitian variety due to its fruity smell has a very niche market while the pompona variety is used mainly in perfumery.

Farmers refute Kurian's contentions. Studies like the one by M S Madan of Indian Institute of Spice Research in Calicut show that vanilla farmers will incur a cost of at least Rs 340 (roughly US $8) to produce one kg of green beans. Other studies show that the cultivators will break even at around Rs 250 per kg of green beans. The price of vanilla in the international market has now stabilised at US $50-US $70 per kg of cured beans and US $5-7 per kg of green beans, in the higher-end quality market. But exporters who control the trade from India say that they cannot sell at this price. They ascribe their reluctance to the opaque nature of the vanilla market.

The way ahead

Paul Jose, managing director of Vanilco, a cooperative which purchases vanilla beans from over 25,000 farmers in the region, blames the government for the state of affairs. He points out that while marketing vanilla to Indian farmers, the government had talked of developing the domestic vanilla market by introducing compulsory labelling in ice-creams and other products. It had talked of promoting the use of natural vanilla in the country itself and provide markets for farmers. Vanilco, he says, has reminded Union government officials of these commitments, but to little avail.

At a meeting with vanilla farmers in 2005, Union minister for commerce Kamal Nath had promised help. But not much has happened since then. In 2006, the Union minister of state for commerce, Jairam Ramesh, had given assurance that the commerce ministry would make it mandatory for all ice creams labelled and sold as "Vanilla Ice Cream," to contain a minimum of 1 per cent natural vanilla in it. "A year has passed, and it is still a mystery why even a meeting that was scheduled has not taken place," Jose says.

PRADIP SAHA / CSE

CHEMICAL VANILLA

Coal tar, paper mill effluent, what else

What we know as vanilla, the queen of spice, is not vanilla. It smells like it (somewhat). It can even look like it. But it is not the real thing, which has aromatic compounds that touch your senses. Instead, what we have in our food, in our beverages, in our cosmetics and fragrances, is a synthetic extract, which has copied the smell of vanilla and captured it in a bottle.

This smell has been harvested from, believe it or not, effluent waste of a paper mill or coal tar components used in petrochemical plants. Artificial vanillin was first synthesised in 1874 in Germany when scientists successfully replicated the chemical signature of vanillin (3-methoxy-4-hydroxy-benzaldehyde). In 1890, French chemists created vanillin from eugenol found in clove. Eugenol was the main source of vanillin till the 1920s. In the early 1900s, came the discovery of vanilla from paper mill waste.

In 1922, the Ontario Paper Company in Canada had no way to dispose off huge amounts of sulphite liquor laced with lignin, which was polluting nearby streams. Chemists found that this waste had something that smelled like vanilla and a counterfeit was born. Lignin, which binds together the fibres in wood, is the waste product in the process of paper making. To remove lignin from fibre, paper companies 'boil' wood with caustic soda. This waste, after the wood fibre is removed for paper making, is called black liquor or sulphide liquor. This is the worst effluent of a paper company.

The vanilla we love to eat in our food comes from this effluent waste of the paper mill. A method has been devised to extract vanillin from the lignin. In this, sulphite liquor is cooked and lignin is extracted from it. The lignin is then purified to get Lignin Vanillin also known as USP Vanillin.

Then there is the petrochemical route. The petrochemical raw material guaiacol is a component of coal tar. Coal tar is chemically processed to replicate natural vanillin. It has a stronger flavour profile than lingin vanillin or natural vanillin. But this ethyl vanillin needs to be used in minute quantities as it might impart a harsh "chemical" character to food. In recent times, chemists have used natural products such as fruits and vegetables to produce vanillin. In fact, Japanese scientists have even extracted vanillin from lignin found in cow dung.

Another non-edible type of vanillin is produced from coumorin extracted from Mexican tonka beans, which has a similar but stronger flavour than vanillin. Due to Coumarin's reported carcinogenic properties, it has been banned by the US Food and Drug Administration (FDA).

Counterfeit has conquered the world in today's food industry. While the world trade in natural vanilla is at around 2,000 tonnes of cured beans or approximately 50 tonnes vanilla extract, the demand for synthetic vanillin in 2004 was more than 30,000 tonnes a year.

The consumption of the synthetic variety is growing at a rate of almost 7.5 per cent per annum with nearly 60 per cent used in the food and beverage industry. In India, about 700 tonnes of synthetic vanilla was imported in 2004, which was bought by ice cream companies and other users.

Cheap and dirty

Companies say they prefer the chemical alternative because it is cheaper. There is no doubt about this. The price ratio between the synthetic and natural product is 1:10 or even 1:15. Also, unlike that of the original compound, prices of the artificial variety do not fluctuate, throwing production out of gear. Therefore industries which make a lot of common edible products—from ice cream, biscuits, confectionery to beverages—have switched to the synthetic copy. But they have never told us about the switch-over.

The companies in this business are the biggest of the big—including the agri-giant Monsanto. A key supplier in India is the US multinational, International Flavours and Fragrance, which interestingly is also in the business of exporting vanilla beans. It is for this reason that vanilla farmer groups allege that this company and others are 'dumping' synthetic vanilla in India. They say that consumers are being offered the chemical alternative at throwaway prices—sometimes even free.

Ben & Jerry

Going Indian natural

Eco Agri Research Foundation (EARF), based in Mysore, Karnataka, has got the fair trade certificate by the UK-based Fairtrade Labelling Organisation International (FLO). Now the foundation along with its trade partner Danisco, a vanilla extractor based in the US, will sell "fair-trade" vanilla to the iconic Ben & Jerry's ice cream of the US. In this ice cream, marketed as classic vanilla, Ben & Jerry also has fair-trade certification for its sugar from farmers in Paraguay.

The certification is a means to ensure that farmers internationally are paid fair price for their crops even when prices fall below market benchmarks. It also ensures that the methods of farming used by them are sustainable and non-exploitative. FLO annually inspects producers to ensure that socio-economic

Vanillin is not vanilla

The problem is that the marketers of vanilla have never really been able to sell us the real compound. Aroma experts say that artificially produced vanillin cannot compete with natural vanilla in taste, even if it makes up in price. Vanillin in its natural state is the main flavouring substance of the vanilla bean. However, along with vanillin there are over 250 different aromatic substances, which give natural vanilla its well-rounded flavour.

Unlike a single metallic flavour imparted by the synthetic variety, natural vanilla releases its flavour components slowly, one after the other, giving it a subtle taste. It is this sequence of flavours, which makes vanilla the queen of spices.

Vanilla grown in different parts of the world has its distinctive flavour profiles. Madagascar's vanilla, considered commercially the best variety, is very often described as rich, smooth, rummy and full-bodied. The Tahitian variety is known to be sweet, very fragrant and perfume-like while its Mexican counterpart has a sharp, slightly pungent, woody, resinous, sweet and spicy flavour.

Tasting for true vanilla

In 2001, the popular American food magazine *Cook's Illustrated,* conducted a review of 18 major super market ice cream brands to rate them for their flavour and texture. Of these 18 ice creams, two had artificial vanillin. Only two of the confectioneries—Blue Bunny regular and Blue Bell French—contained imitation vanilla extract. One failed to make it out of the elimination round, and the other landed in next-to-last place in the main tasting. Clearly, natural vanilla is a key component in good ice cream.

The tasters of the magazine explained this best. "Some of the best-textured contenders fumbled when it came to flavour. Although the occasional ice cream lost points for too-potent vanilla notes (especially "artificial" or "boozy" flavours), by the end of the tasting it was clear why "vanilla" is often synonymous with "plain".

But is industry listening?

criterion is followed using increased fair trade revenue, in addition to sustainable farm management.

According to Jai Chaitanya Dasa, managing trustee of EARF, the foundation has over 600 farmers from four different small producer groups in Karnataka. Of these, 344 farmers are supplying vanilla beans for US $5.30 per kg (Rs 230 per kg), the minimum farm gate price set by FOL for vanilla. "We have been working closely with the farmer groups and have ensured that apart from the correct price, social projects have been under taken for their betterment."

Apart from the price a Fairtrade premium is also paid to the farmer organisations—US $0.59 per kg of bean. Dasa says that this premium is being used to plan for water projects for families. It exports six tonnes of cured beans to Dansico which converts the vanilla in to extracts and sells it to Ben & Jerry. Will all trade become fair trade one day?

WHAT'S ON SHOW

Is our ice cream natural or synthetic?

The 2005 Export-Import Bank of India (EXIM bank) study on vanilla and its potential in India says that labelling laws for ice cream can create a viable domestic market for the essence in the country. Vanilla flavoured ice cream accounts for over 40 per cent of the sales in the country and this industry is one of the key users of this product. But currently, almost all the vanilla we eat is artificial, not natural.

According to the EXIM bank study, artificial vanilla flavoured ice cream accounts for 35 per cent of all ice cream sales in the organised ice cream sector. This sector was valued at about Rs 500 crore in 2005; it is estimated to grow 15-20 per cent annually. The study also reckoned that 200 tonnes of artificial vanillin was consumed by the food and beverage sector in 2005 with the ice cream industry alone consuming

SAMRAT MUKHERJEE / CSE

about 130 tonnes. This consumption is expected to increase to 300 tonnes by 2007.

In India, ice cream makers include big names like Hindustan Lever, which sells the Kwality Walls brand, Amul, Vadilal and Mother Dairy. There are, in fact, a few international brands in the fray as well. The EXIM bank study estimates that even if, "A mere 11 per cent of the present synthetic vanillin used in ice cream industry is converted to natural vanillin use, the demand for about 15 tonnes of natural vanillin would be created. This would mean a demand for 750 tonnes of cured vanilla beans, almost eight times the current production of the country."

Currently, in India, only Amul has launched its all natural flavour called Vanilla Royale. It is buying small quantities of extract from Vanilco. Mother Dairy, the ice cream brand of the National Dairy Development, is conducting pilot trials of its new all-natural ice cream. The company told *Down To Earth* that it expects a commercial launch in 2-3 months.

Observers say that commercial use of natural vanilla will

Synthetic vanilla consumption is growing at almost 7.5 per cent annually. Nearly 60 per cent of it is used in the food and beverage industry. India imported 700 tonnes of artificial vanilla in 2004

require either mandatory use of vanilla in the ice cream, or at the very least labelling of the product so that consumers know what they are buying.

In all countries, the price of synthetic vanillin is much cheaper than its natural original. But a lot of countries have introduced measures to promote the use of the natural product in high-quality food.

US: flavours are mandated

In the US, FDA has mandated that any confectionery that describes itself as "vanilla ice cream," must be flavoured with natural vanilla extracts. For an ice cream to be called "vanilla flavoured ice cream," a mix of artificial and natural essence has to be used. However, the natural ingredient has to be higher than the artificial substance. Ice creams in which synthetic vanillin dominates the natural variety—or which have only synthetic vanillin—must be called "artificially flavoured vanilla ice cream".

For vanilla extract, FDA requires a minimum of 13.35 ounces (28.3 grammes) of vanilla beans to a gallon (approximately 3.8 litres) of alcohol-water mixture, which has at least 65 per cent water content.

Germany has labelling rules pertaining to vanilla use as well. Here food regulations mandate that labelling must differentiate between natural and artificial vanilla. It also specifies food labels for natural bourbon vanilla.

But India: indifference

The Prevention of Food Adulteration Act differentiates between *natural flavours*—obtained exclusively from natural product—*natural identical flavouring substances*—chemically isolated from aromatic raw materials—and *artificial flavouring substances*—not in natural products. It also has separate standards for the quality of ice cream. But there is no provision for either mandatory use of natural flavour, vanilla in ice cream or labelling for it. Manufacturers can use natural or chemical vanilla and pass off the product as vanilla.

The Bureau of Indian Standards has specifications for ice cream. This standard which was last revised in 1995 makes no distinction between ice cream using natural flavours and ones that use natural identical flavouring substances. It simply says, "vanilla extracts and various artificial or imitation flavours shall be added to the mix after pasteurization."

Is price the problem?

When contacted by *Down To Earth*, ice-cream industry representatives harped on the difference in price between natural vanilla and synthetic vanillin. They also say that 'stability' of the price is an important consideration. Currently, a litre of synthetic vanillin sells between Rs 250 and Rs 400, as against a litre of vanilla extract, which sells for between Rs 3,500 and Rs 4,000.

But the economics is not so straight-forward. Take the example of the Kerala milk cooperative also known as Milma. Since January 2006, Milma uses natural vanilla to flavour ice cream, which costs Rs 4,000 a litre. Before this, it procured one litre of synthetic vanillin at Rs 310. But for manufacturing 40 litres of ice cream mix (a gallon), Milma uses 40 ml of natural vanilla. In the case of synthetic vanilla it added 100 ml for the same quantity of ice cream. In other words, it spent Rs 0.70 for one litre, using synthetic flavour and now it spends Rs 4 for the same litre with the natural flavour.

But there is another twist to the ice cream tale. To manufacture commercial ice cream, the product is pumped with air to give it the creamy texture and volume. Without air the ice cream would be akin to an ice cube without the creamy texture and would be very hard to scoop.

The air component can comprise anywhere between 30 to 60 per cent of its total volume. In the case of Milma the air component is about 44.5 per cent—for every litre of ice cream mix, Milma gets approximately 1.80 litres of ice cream. So for every litre of processed vanilla ice cream, Milma only spends Rs. 2.20 for flavouring it naturally while it used to spend Rs 0.38 with synthetic vanillin. In Milma's case the difference of cost between the natural and artificial ice cream comes to about Rs 1.92 per litre.

The EXIM bank study corroborates this. It notes that "use of natural vanilla concentrates in the Indian ice creams may increase the final price to the consumers by about Rs 0.40 to Re 0.60 for every 200 ml cup of pure vanilla ice cream". Clearly, this cannot be too high a price to pay.

The profit margins in ice cream range from 30 per cent to 50 per cent, hence the cost difference between the artificial and natural is not much.

The question is if consumers deserve better or not.

CURE AND SCENT

The technology challenge

Labelling or mandatory use of natural vanilla will go a long way to promote this crop. But this step will be incomplete unless accompanied with technologies to cure and then extract the vanilla. The real profits are in the value addition—turning the green bean into flavoured bean—and then in essence, not in the business of farming the crop.

But this business, like the business of the beans, has been a closed industry controlled by a few companies worldwide. In Madagascar farmers grow the beans but it is others—small group of manufacturers—who cure the bean for flavour. It is only in Indonesia that farmers cure the bean and so earn profits from this value addition. The business of extraction is even more tightly controlled. Only a few companies—mostly in the US and France—are in this business.

The US has also issued a standard of identity for vanilla, which means that it has specific standards for the quality of vanilla extracts. This, in turn, requires specific methodologies, equipment and technologies to deliver the 'real' goods in the business of flavour and aroma.

The Achilles heel

If natural vanilla is to succeed in India, this infrastructure for curing and extraction will have to be built. More importantly, as technologies are tightly held, indigenous development will be needed to perfect the best way to extract the essence. This is the Achilles heel of the business, say many.

For instance, Mother Dairy, in its response to *Down To Earth* regarding its natural vanilla ice cream programme, explained that for the past one year, the samples of natural vanilla it has received from the Spices Board of India have been unsatisfactory.

The ice cream major admits that the use of natural vanilla has distinct advantages over synthetic ethyl vanillin. But the samples supplied to it were not acceptable as they were based on alcohol extract, says the company. Then the board developed a flavour based on glycol, which is a regular diluent.

But the flavour intensity of this essence was low; consumers did not like it. In July 2007, a fresh batch has been submitted by the spices board, which the ice cream company says is "comparable to artificial vanilla". Now it is working to launch its new product with this essence.

But clearly, this is where the other nub of the problem is. In India, the business of extraction is limited to a few companies. The big ones prefer to invest in plants to cure vanilla green beans but then export to extractors in the US and Europe for processing. Vanilco has set up an extraction unit, using technology developed by the Indian Institute of Technology, Mumbai, called the super critical fluid extraction unit. Others are joining in. M/s Sami labs of Bangalore is using the same technology for nutraceutical extraction. Officials of the company say that M/s Sami Labs is working to standardise the extract assay from Indian vanilla beans. But it is finding that while the international market demands 95 per cent assay, it is getting only 40 per cent in its process. The company's representatives say that the problem is in the quality of the curing of the beans. This is simply not on par with quality requirements, they argue.

It is therefore evident that there are quite a few slips between the farmers who grows the bean and the consumer—you and I—who wants to savour the fragrance and aroma of the king's scent. ■

PRADIP SAHA / CSE

Turning beans

Technologies for turning green beans to essence

It is during curing that glucovanillin—a vanillin precursor formed during the ripening of vanilla—is enzymatically converted to glucose and vanillin. The longer the bean ripens, the more concentrated is the flavour. The process is long—it takes 4-6 months.

The process involves wilting or killing the beans (by letting them sun-dry or submerging in hot water); sweating the beans (by rapid dehydration and slow fermentation); and drying them (at low and carefully controlled temperatures). In India, the Central Food Technology Research Institute, Mysore, Karnataka, has designed an accelerated curing technology.

Vanilla extract is a complex compound with more than 250 different chemical compounds. The trick is to extract that "natural" essence with all the compounds, which give its distinct flavour and aroma. Simply put, extracts are made by crushing the vanilla beans, extracting with an alcohol/water mixture and separating the residue from the liquid. Variables such as extraction time and temperature affect the quality of the extract. Commercial extraction of vanilla flavour is expensive. According to a EXIM Bank 2005 study, the costs could range between US $2000 to US $3000 per kg. The extract costs—based on their concentration level—will be in the range of US $30 to US $100 per kg. To extract the vanilla, companies could use different method and technologies—the percolation method, the oleoresin method or the supercritical fluid extraction method. But what is amply clear is that this business is a closely kept secret.

Maharashtra cornered

State of Environment Report 2007 presents a sordid tale

SHYAMAL

NIDHI JAMWAL *Mumbai*

Almost 75 per cent sewage treatment plants in Maharashtra run without valid consents, reveals Maharashtra's State of Environment Report, 2007. The report, a public document released by Maharashtra Pollution Control Board (MPCB), outlines present conditions and some future projections on environment. Prepared by the Mumbai-based Indira Gandhi Institute of Development Research, the report is based on data studied against parameters such as water, air, noise and forests etc. However, there are concerns that some of the data are outdated—data on wastewater generation, for instance, is 10-year old. It also lacks trend analysis and fails to make proper projections.

Sewage, water supply

The report says about 99 per cent of sewage generated by municipal councils and over 50 per cent sewage discharged by municipal corporations goes untreated into either of three major river basins—Godavari, Tapi and Krishna. Wastewater generated from Latur, Ahmednagar and Nanded is 20 mld (million litres per day), 22 mld and 25.6 mld, respectively.

The water supply data in rural areas is for the year 2000, showing only 55 per cent villages and 64 per cent hamlets have a per capita water supply of more than 40 lpcd (litres per capita per day).

Wide disparities, however, exist between supply in urban and rural areas. Mumbai has a maximum average water supply of 200 lpcd but even within the city, the slum areas barely receive 90 lpcd and the well-off areas get 300-350 lpcd (see table: *How even?*).

Pollution

Increase in vehicles is the reason of growing pollution in the state, the report states. Maharashtra Pollution Control Board's monitoring results for 2005-06 show that levels of respirable suspended particulate matter and suspended particulate matter exceed in more than half the locations monitored. The monitoring report has found that two-wheelers constitute major share (69.32 per cent) of vehicles in the state followed by four wheelers at 13.37 per cent. Pune region alone accounts for about 20 per cent of the total vehicles in the state followed by Greater Mumbai at 13 per cent. Further, two wheelers and four wheelers (except taxis) constitute 81 per cent of the total vehicles in Greater Mumbai.

Clearly, private vehicles take up more and more road space at the cost of public transport.

Solid waste

The section on solid waste in the report puts together available data on municipal solid waste (MSW), hazardous waste , electronic waste and biomedical waste. Maharashtra generates over 16,000 tonnes per day of MSW, of which almost 50 per cent is generated by Mumbai :7,000 tpd. Pune generates 2,123 tpd, while Thane generates 880 tpd of MSW. According to the projections made by Nagpur-based National Environmental Engineering Research Institute, MSW in the state is estimated to increase to 8.05 million tonnes by 2011 and 11.77 million tonnes by 2021. Electronic waste generation is already at 20,270.6 tonnes per annum.

Hazardous waste generation is pegged at 1.4 million tonnes annually (50 per cent of the total hazardous waste generated in the country) with Thane, Ratnagiri and Raigad generating the maximum amounts. The report also claims that Maharashtra produces almost 60 per cent (31.5 tonnes per day) of the total biomedical waste produced in the country.

Forests and biodiversity

The report has taken Forest Survey of India's (FSI's) data to show a dramatic increase in the state's forest cover; from 30,740 sq km in 1980-82 to 47,482 sq km in 2001. The data, however, has questionable basis. *Down To Earth* had earlier analysed FSI's data and found gaping holes in the forest cover figures (see 236,800 hectares more, *Down To Earth*, May 15, 2003). Moreover, the report has made recommendations, which are way too general—check urbanisation, coordination between agencies, forge public private partnerships, for instance.

Overall, however, the state of environment report makes for a good beginning with much scope for improvement though. It is also to be seen if this report with be updated annually. Only then will it be a fruitful exercise. ■

How even?

Distribution of water in 40,402 villages and 45,528 hamlets

Category	Villages (per cent)	Hamlets (per cent)
Villages with per capita water supply of more than 40 lpcd	54.97	64.02
Villages with per capita water supply between 10 lpcd and 40 lpcd	33.75	22.65
Villages with per capita water supply of less than 10 lpcd	8.25	9.58
Villages not covered by safe water source	3.03	3.75

Headache relief

An ayurvedic way of curing migraine

VIBHA VARSHNEY

THANKS to ayurveda, Subhash Jacob is free from migraine now. The headache was with him for over 30 years. Repeated attempts at seeking cure from different schools of medicines were ineffective and left him with many side effects. "I am 90 per cent cured after I took the ayurvedic treatment," says Jacob, a scientist at the Indian Institute of Science, Bangalore.

Spin of pain

The treatment that Jacob took was developed in 2002 by Balendu Prakash, the director of the VCPC Research Foundation in Dehradun, Uttaranchal. A blend of five herbo-mineral drugs mentioned in the ancient ayurvedic texts, the new treatment, according to Prakash, cures the headache in 120 days. He has trained many traditional practitioners around the country in the system. They later applied the treatment on more than 400 migraine patients in Karnataka, Andhra Pradesh and Maharashtra. The findings of their experiments with migraine were presented at the 13th Congress of the International Headache Society (IHS), Stockholm (see figure: *Better feedback*).

The study followed guidelines for traditional medicines set by the World Health Organization, which puts migraine as 19th in the list of causes for 'years lived with disability'—work days lost due to the disease. It is estimated that migraine costs US employers over US $ 24 billion every year.

Therapeutic ayurveda

Prakash and the traditional practitioners conducted the experiments between May 2005 and March 2007 among patients who were suffering from the most common form of migraine—migraine without an aura. They were advised to rearrange their lifestyle and diet; to give up coffee, chillies, onions and red meat, to name a few. The drugs given included *narikel lavana*, *sootashekhar rasa*, *sitopaladi*, *rasonadi vati*, *godanti mishran*—a mix of herbs like ginger, turmeric, charcoaled coconut, *dhatura*, bamboo, and minerals like silver oxide, copper oxide, sulphur and gypsum.

According to the *vaidyas*—traditional ayurvedic practitioners—the treatment works on the principle that migraine occurs when the acid-alkaline balance in the stomach is disturbed. This, according to them, leads to increased *pitta*—a measure used in ayurveda to check a person's health using the pulse—and affects body functions. "The medicine helps maintain the balance," says S Raghvendra Babu of the Padaav-Speciality Ayurvedic Treatment Centre, Bangalore, who co-ordinated the study.

The cure is also dependent on the change in lifestyle of the patients, say experts. Though considered genetic in nature, a variety of environmental factors trigger migraine—stress, change in weather and the food consumed. Both ayurveda and allopathy cite irregular eating habits like long intervals between meals as causes for migraine. "Under allopathy, a neurologist treats migraine while in ayurveda it falls under gastroenterology," says Babu.

The practitioners pooled data from different clinics and analysed it. "This multi centric documentation of clinical practice is a novel method of ayurvedic research," says Prakash. But Ish Anand, a neurologist at the Sir Ganga Ram Hospital, Delhi, does not approve of the research method. "Double blind study under which the efficacy of a treatment is tested against a placebo is the only way," says Anand.

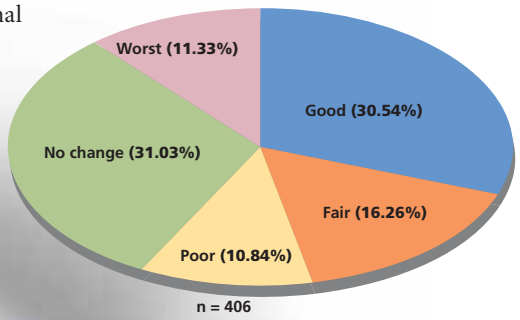
More viable

What makes the ayurvedic treatment significant and more viable? Studies show that the patients following allopathic treatments for migraine for long tend to be dependent on drugs. There have been cases of medicine over-use causing headaches in patients, which demands further medical help. But the ayurveda method has little side effects and the shorter spell of treatment also reduces treatment cost. A full course of the treatment costs between Rs 8,000 to 12,000 while a month's medicines cost about Rs 200 in allopathy, which demands a lifelong treatment.

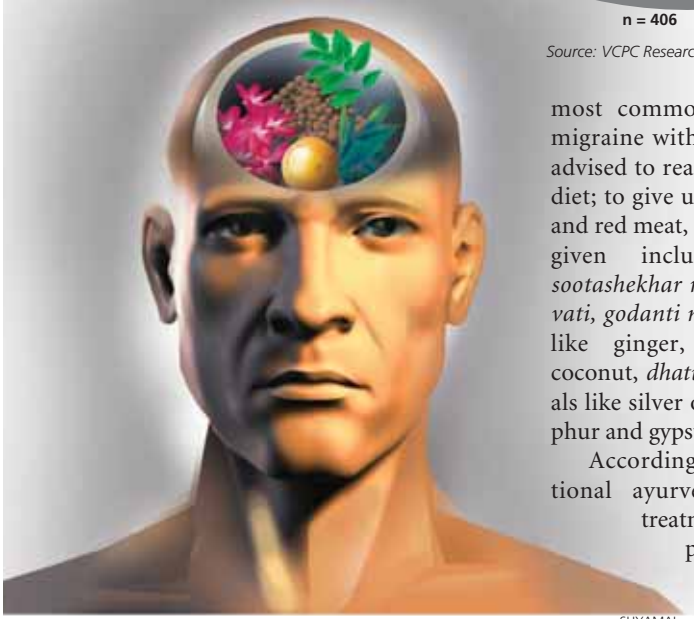
The global market for allopathic migraine drugs is worth US $3.4 billion; experts, however, say this will go down to US $3.2 billion by 2015 with cheaper drugs reaching the market. In India, the ayurvedic drug industry is ready to tap this market. Ipca Laboratories, Mumbai, is trying to market the ayurvedic treatment for migraine. This could help the about 20 per cent people suffering from migraine in India. ■

BETTER FEEDBACK

The treatment has few side effects



Source: VCPC Research foundation, Dehradun



SHYAMAL

EVOLUTIONARY SCIENCES

Discovery channel

First Indian study on species discovery pattern

KIRTIMAN AWASTHI

THERE is little chance for a new bird or butterfly being discovered in the Western Ghats now, says a recent study. It has, however, not ruled out the discovery of frogs and grasses.

First time in India, a team of researchers including scientists from the University of Agricultural Sciences in Bangalore have classified the patterns of species discovery of eight important animal and plant groups in the Western Ghats. The study has analysed the factors which helped in the discovery of these species.

The species studied included birds, butterflies, frogs, tiger beetles, grasses, ferns and orchids. The findings have been published in the June 2007 issue of the *Journal of Biosciences* (Vol 32, No 4).

The researchers gathered data on four animal groups (birds, butterflies, frogs and tiger beetles) and four plant groups (asters, grasses, orchids and ferns). "The selection of species was based on the availability of relevant data and the clarity of their taxonomic status," says R Uma Shaanker, professor at the department of crop physiology, University of Agriculture Sciences, Bangalore.

Determining factors

Many of the species recently discovered in the Western Ghats, a biodiversity hot spot, were amphibians. "Species discovery in a region follows a specific pattern. A number of factors determine the way species are discovered," says Shaanker. They include, he says, body size, colour, range of movement and visual appeal of the species.

Many studies have linked the rate of species discovery to body size, for example, in British beetles, to body size and range of species movement in neotropical mammals and North American butterflies. In South American oscine passerine birds, the chance of discovery was influenced by quantity, geographic and altitudinal ranges of their movement and body size.

In the Western Ghats, say researchers, factors such as body size, colours on feathers, nature of the habitat and feeding habits determined the discovery of birds. For butterflies, the researchers found body size (wing span), number of colours on the wings and the altitudinal range as determining factors. On flowers like orchids, the study considered the number of flowers in inflorescence—floral arrangement in a plant—size of the flower, length of inflorescence and the characteristics of the habitat.

The discovery pattern for birds and butterflies showed saturation which means, in all likelihood, there is little chance for further discovery among the group.

The last bird—maroon-breasted sunbird *Nectarinia lotenia*—from the Western Ghats was found in 1944 and the last butterfly—small long-branded bush brown *Mycalesis igilia*—was found in 1911.

Discovery pattern for ferns, tiger beetles and asters also showed that there is only marginal scope of discovery.

Chance list

There are more species yet to be discovered among frogs and grass. Locally seen—endemic—frogs have an edge over their non-endemic counterparts, says the study. The orchids too share the same pattern. "Non-endemic species are more widespread and the chance for them being discovered are high while endemic species are confined to a narrow range," said Shaanker.

Birds were the earliest to be discovered while the discovery of frogs occurred later, says the study. Among plants, orchids were the earliest to be discovered while grasses were found much later.

On the evolutionary front, grasses are among the most modern taxa—group of species. Researchers, however, do not agree that the pattern of species discovery is linked to evolutionary trends. "A few tax might have reached saturation. This does not mean that more biodiversity cannot be uncovered," clarifies Shaanker. The advancement in the science of taxonomy like using genetic analysis can help in identifying new species, he adds.

"Despite the excellent taxonomic literature available for India, not much is known about the species discovery patterns in the country," says Shaanker. According to researchers, the study has significant implications for strategising the species discovery process in the country and help scientists in fixing the groups of species to be explored. ■

Cousins coming: New species likely to be discovered from the Western Ghats include frogs

BRIJ KISHOR GUPTA

AIR POLLUTION

Metro travails

Long commuting bad for eyes

DAILY commuting in metros can harm your eyes. Research by the Delhi Institute of Pharmaceutical Sciences and Research, the Venu Eye Institute and Research Center and the Dr Rajendra Prasad Center for Ophthalmic Sciences says exposure to vehicular air pollution damages the surface of human eye.

The results were published in the *Indian Journal of Occupational and Environmental Medicine* (Vol 11, No 1). The researchers examined the eyes of 441 commuters in Delhi, who have been travelling through highly polluted areas for two years. Another 79 people who travel less were also studied and both the results were compared.

The study examined the distance of travel, commuting time, mode of transport, frequency of daily travel in a year and the total travelling time of both the groups. The commuters history of symptoms such as redness in the eye, blurred vision and photophobia— eyes' intolerance to light—were examined.

The results (see table: *Polluting travel*) showed that people who travel long distance faced more problems. While 45 per cent from the less travelled group reported various symptoms, 78 per cent in the former group had problems.

According to the researchers, the problems occur due to the rising level of nitrogen dioxide and suspended particulate matter, which, they say, increase the acidic value of tears. This creates irritation on the surface of the eye, eventually triggering diseases. Researchers say wearing goggles while travelling and using artificial tear supplements can protect the eyes. ■

POLLUTING TRAVEL

Tears become acidic

Symptom	Per cent people suffering from diseases	
	Control group	Study group
Redness	14.28	38.32
Watering	22.44	49.21
Irritation	20.40	43.99
Strain	24.49	45.12
Sensitivity to light	2.04	13.82

RANJU GHOSH / CSE

Dhapa landfill: Home to friendly bacteria

BIOTECHNOLOGY

Wetland bugs

Double up as bio-pesticides, fertilisers, biotech enzymes

BIPLAB DAS *Kolkata*

A LANDFILL in the East Kolkata wetland area has emerged as a treasure trove of useful microbes that could be tapped for various biotechnological purposes.

Researchers from the Dr B C Guha Centre for Genetic Engineering and Biotechnology and the department of biochemistry at the University of Calcutta, and the New Delhi-based Centre for Genomic Application stumbled upon a plethora of such bacteria in the Dhapa landfill area. They analysed the rich find to conclude that several of these bacteria could help increase soil fertility or act as eco-friendly pesticides. They also found enzymes that promise rich biotechnological returns.

"We have identified bacterial strains, which could fix nitrogen and produce extracellular enzymes like protease, cellulose, and xylanase and dissolve inorganic phosphates," says lead researcher Dhrubajyoti Chattopadhyay.

With its microbial biodiversity, the Dhapa landfill could be tapped by industrial houses as a microbe resource utility. The findings of the study have been published in the May 20 online issue of *Microbial Ecology*.

Good dump

The dump-yard, a haven for vegetable growers for over hundred years, is still the favourite despite being loaded with toxic wastes. After collecting soils from four different agro-ecosystems around the landfill, the team studied its microbial community as well as its biochemical nature. They identified 38 bacterial strains using a special technique called polymerase chain reaction. This helped them study a piece of common gene that codes for a specific ribosomal RNA sequence (16 S rRNA sequence, a part of cell that aids in protein synthesis) in the bacteria.

Forty seven per cent of the isolates were found to be Bacilli (18 strains). "The isolation of Rhodococcus species was of importance since these organisms are known to be capable of degrading complex organic compounds," Chattopadhyay points out.

Such bacteria are not common in every landfill. Some of the Bacillus strains produce insecticidal extracellular toxins and can be used as biopesticides. "We also have an isolate that was not identified either by biochemical or molecular technique and could be a novel species of bacteria. We have named it DCU-C1," he says.

The team plans to study non-cultivable bacteria using special genomic technique. This could show the structure-function relationship of the soil area. They are also interested in producing industrially viable high quality products from isolated organisms of Dhapa using recombinant DNA technology. ■

HEALTH SCIENCES

Resistant

An influenza virus to drugs

VIBHA VARSHNEY

RATIONAL use of drugs may not always delay resistance to a drug. A research team led by the National Institutes of Health in the US has found that the influenza virus H3N2 were resistant to drugs belonging to the adamantane group irrespective of whether they were exposed to the drug or not. Examining an international collection of viral genomes, they found a single type of mutation was responsible for every case of resistance.

They say resistance to the drug was developing in the virus as a natural process by which the virus developed into an effective organism. The frequency of resistance to adamantane drugs has now increased from about 2 per cent to 90 per cent around the world. For example, viruses in the US, where an average of 1.5 million adamantane dosages was prescribed annually, and countries like New Zealand and Japan, where the drug is rarely used, were resistant to the drug.

Drug is not enough

This resistance can be attributed to a single replacement of an amino acid. "The study shows drug resistance can evolve by unusual means," says Edward C Holmes, Center for Infectious Disease Dynamics, Department of Biology, Pennsylvania State University.

"The resistance mutation gets linked to another beneficial mutation located elsewhere in the viral genome. The increasing use of the drug does not lead to this resistance. So stopping the use of the drug will not reduce resistance," he adds. The accepted theory about drug resistance is that if the virus is exposed to the drug, only those that are resistant to it survive, making the drug ineffective in the future. The new research shows the virus would become resistant regardless to exposure, suggesting that strategies involving careful drug use might not work. This implies that adamantanes may not be useful for treating influenza viruses in the long run. The paper was published online on May 23, 2007, in the journal *Molecular Biology and Evolution.*

In January 2006, the US Center for Disease Control and Prevention announced that amantadine and another drug rimantadine should not be used for such treatment. Instead, the agency recommended using oseltamivir (Tamiflu) or zanamivir (Relenza). Adequate rest and abstaining from alcohol can help check flu. Experts say that anti-viral medicines are recommended only if there is a risk of complication. ■

PHYSICAL SCIENCES

Safe solar cycle

Study refutes theory of risky solar activities

ARCHITA BHATTA

THE new solar cycle will be least risky for satellites; best for communication systems and safe for the aeroplanes flying over the poles, says a new study. Published on the March 29 issue of the *Physical Review Letters*, the findings of the study rules out earlier theories which stated otherwise. Scientists from the Bangalore based Indian Institute of Science (IISc) say the assumptions that solar activity will be the highest in the next cycle are baseless. The new cycle starting in 2008 will be the weakest in 100 years, they say.

Wrong prediction

On March 3, 2006, a study in the *Geophysical Research Letters* predicted a worst spell for satellites and magnetic activity at the poles. This, said scientists Mausumi Dikpati and Peter A Gilman of the Colorado-based National Centre for Atmospheric Research, is due to a strong solar activity which is leading to strong disturbances in electromagnetic radiations. While the Earth's magnetic field interacts with the solar magnetic field, it causes disturbances in the electromagnetic field on the surface of the Earth, the scientists said.

PRADIP SAHA

Safe sojourn: An extreme solar activity is not expected

Such disturbances, when extreme, can affect electrical devices, they argued. "The assumptions were faulty. The study took some processes as deterministic that were actually random," says Arnab Roy Chowdhury, the lead author of the study by IISc. He says that the previous study assumed that the future characteristics of the solar magnetic cycle can be predicted on the basis of antecedents in the model.

Developing a model of internal dynamo of the sun, the scientists tried to predict the strength of the cycle. The solar dynamo converts the turbulent movement of solar material into magnetic energy. Chowdhury says this model was wrong. "It was designed on the assumption that a key mechanism in the solar dynamo is deterministic." The IISc scientists have predicted a weak cycle on the basis of a corrected model which takes care of the random nature of the mechanism.

Solar activity in the next cycle, the 24 cycle, will be 35 per cent less than the previous one, says the IISc study. "The strongest solar cycle so far recorded was in the 1950s. Then there weren't too many satellites and not much damage had occurred. Solar activity in the 22 cycle led to striking down of electric grids in Canada. If solar activity of such a scale occurs today, it will cause great damage," says Chowdhury. ■

EVOLUTIONARY SCIENCES

Species haven

Evolution in temperate regions faster than in tropics

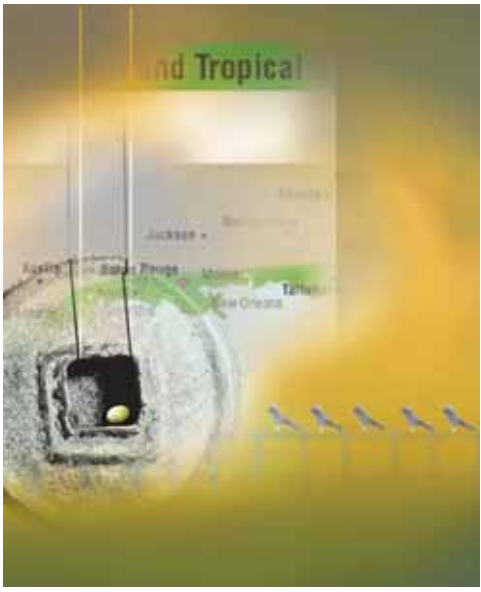
ARCHITA BHATTA

NEW evidence suggests that evolution of birds and mammals in the temperate zone is faster than in the tropics, contrary to an earlier theory that said tropics were more favourable. It has been believed that since the tropics have more number of species, the rate of evolution is more in this region. Scientists at the University of British Columbia now say that tropics have more number of species because the rate of extinction of species is less there.

Faster temperate

In a paper published on March 15 in *Science*, they proved through DNA analysis of closely related species that speciation—the process by which one species splits into two—takes place faster in temperate zones than in the tropics. Researchers have charted the genetic family tree of 309 mammal and bird species in the Americas. The rate of speciation at the equator was found to be around 0.18 new species per species per million years. The extinction rate here was around 0.04. At the transition between tropical and temperate (23° latitude) regions, the speciation rate was higher at around 0.38 and extinction rate at 0.25. At the transition between temperate and the arctic (65° latitude), the speciation rate was lower at around 0.8 while the extinction rate was higher at 0.67.

Jason Weir of the University of British Columbia, one of the authors of the study, said these measurements included studies from North, Central and South America but excluded oceanic islands like the Caribbean. The reason behind difference in evolution of species was most likely intense climatic fluctuation at high latitudes as opposed to much more stable climate in the tropics.



SHYAMAL

"Climatic fluctuations most likely exposed species to the pressures of selection, increasing the rate of evolution. Also, they pushed habitats southwards during cooling episodes. That's how species ranges might have become more fragmented than in the tropics. Range fragmentation is necessary for speciation to occur in birds and mammals. On the other hand, climatic instability seems to be the cause of a high extinction rate," Weir added.

No generalisation

Scientists working on speciation acknowledge that the work highlights a new direction in the variation of speciation rate with latitude. At the same time they point out that the theory cannot be generalised for all species.

"There have been two major hypotheses for greater species diversity in the tropics—greater speciation rate and lower extinction rate. However, the calculation of speciation rate on the basis of DNA analysis is relatively recent," says Kartik Shanker of the Indian Institute of Science, Bangalore.

DNA data showing species age was not available till about 15 years ago and the data for this kind of analysis was not available till three years ago, he said. "This is one of the first studies on the differences in speciation rates between temperate and tropical regions on the basis of DNA analysis. It is wide-ranged. However, what is true for the species represented in this study may not be true for all the species," he added. ■

BYTES

PROBLEM DRUG: Pediatric ritalin use may affect developing brain in children, says new study. Use of the attention deficit-hyperactivity disorder drug may cause long-term changes in the brain, suggests a study on very young rats by researchers from the Weill Cornell Medical College in New York. Ritalin—methylphenidate—a stimulant similar to amphetamine and cocaine, is one of the most prescribed drugs for behavioural disorder in many parts of the world.

HOT NEWS: Mexican food is the oldest in the world, say scholars from the Smithsonian's National Museum of Natural History in the US. Many consider the cuisine one of the world's tastiest. Plant remains from two caves in southern Mexico analysed by the ethnobotanists show that as early as 1,500 years ago, people in the region enjoyed a spicy fare similar to the Mexican cuisine today.

WIRELESS WAVE: Multi-gigabit wireless research may soon push wired computers and peripherals to the past. Scientists at the Georgia Electronic Design Center at Georgia Institute of Technology are researching on the use of extremely high radio frequencies to achieve broad bandwidth and high data transmission rates over short distances.

Within three years, this approach could result in what the researchers call the personal area network applications, including next generation home multimedia and wireless data connections which would be able to transfer an entire DVD in seconds.

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DEEP UNITY

Mine workers in different parts of Rajasthan have got together to form cooperatives. ARCHI RASTOGI **visits them and finds that these cooperatives are an entrepreneurial success**

RUN PDS SHOP IN RAJSAMAND, GET FISHING LEASE

It sells kerosene, sugar, rice, wheat, and occasionally, corn, much like any other public distribution system outlet in the country. But the ration shop at Ummarwas in Rajasthan's Rajsamand district is refreshingly different from the archetypal public distribution system outlet. The difference lies in the way it's administered: the shop is run by a 17-member labourers' cooperative. The cooperative has even secured a fishing lease.

The venture had its beginnings in crisis. Mining had been the major avenue for employment people in Ummarwas—and many other adjoining villages—till about five years back. It was then that operations became mechanised, reducing the need for labour. Additionally, labour from Nepal, Uttar Pradesh, Bihar and other parts of the state started to take over work.

Unemployment was on the rise when a union of mine labourers, Udaipur Sambhag Khan Majdoor Union, was formed. The union's Rajsamand chapter today has 3,000 members. Sampat Lal Bhil, its secretary, talks with justifiable pride at the way the union pressed for better working conditions. "We are paid in time, have attendance cards, security gear and insurance. Some workers even get provident fund," he says.

But more innovative were the activities of the 17-member cooperative that they went on to form: Adivasi Karigar Majdoor Shramik Hitkari Sahkari Samiti Limited, Rajsamand. Rana Sengupta, managing trustee of the Jodhpur-based Mining Labour Protection Campaign, the NGO that helped the labourers in their endeavour, says: "Unions may or may not be very effective. Cooperatives, in contrast, are surer ways of getting livelihood. And since a mining lease in Rajsamand was expensive to get, the cooperative looked for alternatives."

Alternatives

And alternatives they found within the village. In July 2006, the members spotted advertisements in the papers for a lease to fish in the lake at Ummarwas. Though they had no knowledge of fishing, they managed to put up a bid. And the cooperative won it.

But breeding fish is no easy activity. The villagers approached a fishing contractor and he guided them to a group of fishermen in a neighbouring village, who worked as a consultant of sorts. They helped with selecting the species to fish and in cleaning up the lake. The roe was procured from far-away Jaipur; this cost them Rs 40,000. There is now a guard at the lake till the fish is harvested. The cooperative plans to harvest the fish after Diwali this year.

What about the economics? Sampat Lal, the treasurer of the cooperative, has that worked out well. "We have spent about Rs 70,000 on the fish so far, but the returns should be about Rs 1 lakh, a year. Fish will sell for Rs 40 a kg at wholesale price. The fishermen will buy it themselves, we don't even have to bother with all that," Lal says, counting the nearby markets for fish.

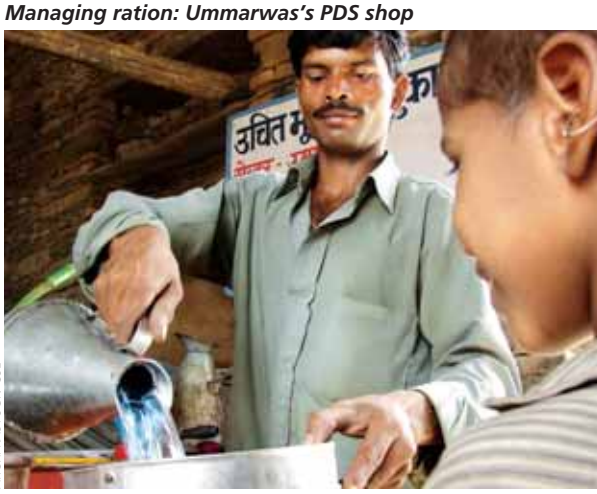
Confidence

In mid-2006, the cooperative answered an advertisement for a ration shop in the papers. Sampat Lal was sent for the mandatory meeting with the government officials because he is among very few educated in the group. "They preferred us over the others because we are a cooperative of poor tribal," he says with justified elation.

The returns from the shop are not that high, but Lal points out, "the aim of the shop is more welfare than profits. This way, the cooperative pays back the union in some ways." The villagers are also show gratitude. Nrip Singh Rana, a resident, says: "The PDS shop is quite timely. At least we don't have to go elsewhere for provisions."

The cooperative is now looking forward to a UNICEF project on rural development for which they have applied. They also have plans to take up a mining lease, for which they will start saving from the profits of fishing. The mood is upbeat even as Lal gets pensive: "The cooperative has seen much worse days. This won't last for long now. The returns and good days will soon start."

Managing ration: Ummarwas's PDS shop



ARCHI RASTOGI / CSE

It's mine: A cooperative run mining lease in Jethwai, Jaisalmer district

SAMRAT MUKHERJEE / CSE

AND IN JAISALMER THEY ARE MINE OWNERS

How to get a mining lease is something Kushala Ram is well-versed with. He was a mining worker himself—like a lot of many other people in Jethwai village in Jaisalmer district. That was till 2001, when he cast in his lot with a newly-formed mine workers' union.

The union has now become a successful cooperative and Ram's esteem gets an enormous boost when he's involved in any decision pertaining to mining. Not that he minds the money that comes with the endeavour.

"It was in the year 2000 that we decided not to take exploitation by mining contractors any more. But we were also aware of our limitations. We knew that we had very few skills apart from those required to work sandstone mines," Ram says.

Many like him got in touch with the Mining Labour Protection Campaign in 2000. Interactions with a Jodhpur-based NGO led to the forming of the Pathar Khan Mazdoor Union in 2001. In 2002, 17 of the 95 members of the union came together to form the cooperative, Pathar Khan Sramik Sahakari Theka Samiti. The move was to prove beneficial not just to the members of the cooperative, but also to the labourers who worked at the 170-odd mine leases that operate in the area.

The false starts

"We did form a cooperative, but money was a huge problem, initially," says Kana Ram, the cooperative's secretary. A lease to mine sandstone meant an expenditure of Rs 1 lakh, quite a forbidding amount for a fledgling labourers' cooperative. So till 2003, Pathar Khan Sramik Sahakari Theka Samiti could not follow up its lease applications.

They were helped out of the rut by a loan of Rs 1 lakh from Mining Labour Protection Campaign. The first two leases came in 2003. The next big procurement was a crane in 2005. It cost Rs 9.5 lakh. The cooperative borrowed Rs 2.5 lakh from a local bank. The Mine Labour Protection Campaign lent it Rs 4 lakhs. The crane was a necessity, renting it meant Rs 40,000 per month. Today with a few leases, they can adjust the use of the crane and even loan it to others.

Next on the cooperative's shopping list is a truck, and later, even a cutter. This would use the scrap, which is otherwise wasted, to make tiles. But all this after the new leases they applied for in December 2006 come through.

Fringe benefits

That people in Jethwai were running their own operation benefited others who worked elsewhere. The most skilled labour would previously get Rs 100 a day. But when the cooperative paid their labour up to Rs 200 a day, other contractors were forced to match up. Other conditions improved: medical kits were brought, timely wages were ensured and attendance cards were made. And the best part: water was provided at the site. "One would earlier have to get water from about 2 km away. Contractors now provide for water at the site," says Magga Ram, another worker. The working hours are also being followed.

"Other labourers pressed for similar conditions at their sites. In extreme cases, the union too stepped in," says Poorkha. (Yes, not every labourer's condition has improved. But that has been in cases where they were heavily indebted by contractors and couldn't leave them or in cases where the relationship was too good to break.)

The cooperative also got the *panchayat* to allot land for plantation. We are trying to convince contractors that less money is needed for the compensatory plantation than is needed to bribe the government official, the cooperative members add in unison.

The best part, according to them, is the new-found confidence. They now get to collectively decide who to sell their product to, and at what cost. "We allot responsibilities to members for selling. He finds buyers and we all approve. But at least we feel confident that we are managing our own affairs. We are working for our own," gushes Kushala Ram. ■

Buckets lined up for water

WET

PHOTOGRAPHS: SURYA SEN / CSE

It used to receive maximum rainfall in the world, once. Cherrapunjee is beset by water problems now.

NITIN SETHI / CSE

When Sted Syiemlieh was a little boy, people in his mountain village, Tyrna, a few km from Cherrapunjee in Meghalaya, could predict when the skies would open up. "It was always at the same time," the 75-year-old farmer says. "Those days, we could tell how long the rain would last. If it went beyond three days, we knew that the rains would go on for nine days. So, we would prepare to plant our crop accordingly," he says.

Back then people in his village used to plant oranges, coffee beans, *paan* and bay leaves, betel nut, sweet potatoes, yam and other tubers which they traded for rice, vegetables and dried fish at the weekly *haat* some 25 km away, in what's now Bangladesh. That trade stopped decades ago with the drawing of borders. "Those days, we did not have to worry about food like we do now," Syiemlieh says. "Now everything is upside down. It's difficult to predict when the rains will come."

Difficult to predict maybe but skies do open up in Meghalaya's East Khasi Hills. It had been pouring incessantly since we left Shillong for Cherrapunjee in the wee hours of June 16. Thick, swirling clouds that give this northeastern state its name—Meghalaya, abode of clouds—had reduced visibility to near-zero in places.

"It's no longer Cherrapunjee, we call it Sohra, now," Raymond Kharmujai, a young local journalist and my guide for the day, informs me. After over 180-years of going by the name given by the British, who couldn't quite master *So-ha-ra*, the once undisputed wettest place on earth has now officially reverted to its traditional Khasi name.

Located at 4,267 feet above sea level and well connected to the Sylhet plains (in what's now Bangladesh), Sohra was the first British headquarters in northeast India. The English who settled here in 1820, calling it the "Scotland of the East", were also the ones who discovered its special status as the wettest place on the planet. But the rains proved too much for even the hardy colonists, and in 1850 they beat a retreat from Sohra.

Ghostly shapes

As our car snaked down the winding road, I peered through the rain-streaked window to discern the ghostly shapes we were speeding past. The landscape was barren but grassy. What used to be hills but were now just silent, wounded pieces of earth, gouged out, cut in half, denuded for their timber and soil.

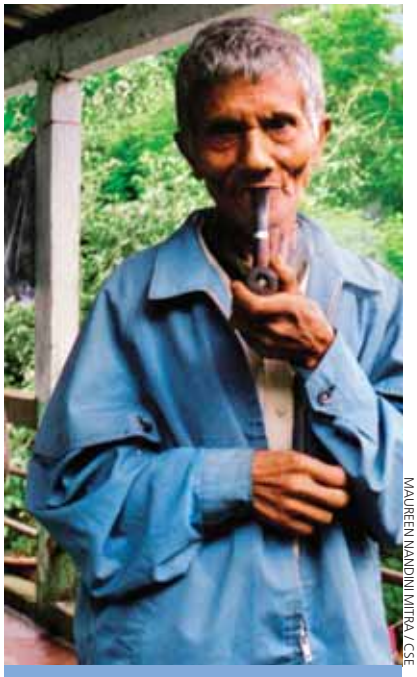
Here and there by the roadside, there were little holes in the earth surrounded by heaps of coal leaking streaks of black water—rat-pit coal mines, they are called. And limestone kilns with thatched roofs—out of commission during the monsoons—but still giving out the acrid smell of burnt lime.

It still rains buckets

DESERT

MAUREEN NANDINI MITRA / CSE

It still rains quite heavily. But most of the water drains away. MAUREEN NANDINI MITRA finds out why



MAUREEN NANDINI MITRA / CSE

Sted Syiemlieh:

Earlier we knew how long the rains would last. We would plant our crops accordingly, and there was always enough

Meghalaya has extensive deposits of coal and limestone (used to make cement), concentrated largely in the southern slopes of the state—the East Khasi Hills, the Garo Hills and the Jaintia Hills districts. The total estimated reserve of coal is 640 million tonnes and limestone reserves are estimated at about 5,000 million tonnes.

Off season

It's a Sunday morning and Sohra town is pretty much deserted. All shops are closed, and the downpour has kept most people off the street. So we move on to explore the nearby villages, stopping at one of the lime kilns by the roadside. Two workers stand guard over stacks of damp firewood. The rest, says one of them who gives his name as Sangma, will return in October, after the monsoons end. When it's functional, the kiln sometimes burns for weeks. The two workers live in a little raised shack by the kiln and make occasional trips to Sohra town market for food. "Not much to do here during this season, just watch the rain and try to keep dry," says Sangma.

Rampant deforestation

Sohra and its surrounding areas receive both the southwest and northeast monsoon showers. From June to September, the monsoon comes in from the Bay of Bengal over Bangladesh.

The heaviest rainfalls are experienced during these four months. Because there are no mountains in Bangladesh, the rain-bearing clouds are forced to deposit much of their moisture and rain on these hills. In the winter it receives the northeast monsoon showers.

For many years Sohra was considered the wettest place on earth. It features in the Guinness Book of Records as the place with the highest rainfall ever in a calendar year—22,987 mm between August 1880 and July 1881. It also holds the record for the highest rainfall in a single day: 2,455 mm in 1974.

But it's no longer the wettest place, largely due to rampant deforestation. The small town and the villages around Sohra—home to over 70,000 Khasis—have been receiving less and less rain over the years.

According to the Regional Meteorological Centre in Guwahati, Sohra's yearly rainfall average over the last decade stood at 11,070 mm. Last year, it recorded only 8730.1mm, about 35 percent less than even the normal average rainfall. The competition for wettest place is now between nearby Mawsyrnam (where the average rainfall is 11,873mm) and Mount Wai'ale'ale in the Hawaiian island of Kaua'i (average rainfall 11,684 mm).

...and no top soil

Today, Sohra is the wettest desert on earth. With no trees or big reservoir to hold it back, rainwater runs down into Bangladesh. All around the mountainside, during the monsoons, one can see a host of waterfalls rushing downhill.

And by winter they all run dry. As do the local springs. Sohra faces acute water shortage, especially during winter. People here often have to walk for miles to collect drinking water from government-installed pipelines set up nearly 25 years ago. And even that supply, which comes twice a day, isn't free from contamination by bacteria and runoff from the coal mines.

"The rain also washes away the topsoil every year, hampering farming and reforestation efforts," says O P Singh of the Centre for Environmental Studies at Shillong's North Eastern Hill University. "There's no sustainable water supply in the valley, though people are beginning to build small check dams for irrigation," he says. More than 50 per cent of the forest cover in and around the Sohra valley is gone and Singh believes replacing it would require new methods of replanting.

With agriculture suffering people have had no choice but to look for alternatives like mining for coal, limestone and stone quarrying

With agriculture suffering people have had no choice but to look for alternatives. Like mining for coal and limestone and stone quarrying. Most work as daily labourers in the mines or in the lime kilns, or run the mines themselves. "A few still grow betel nut and *paan* leaves, and others make a living by cutting grass to make brooms, says Badaiahun Wanwar," a local primary school teacher at Tyrna.

Boundaries snap trade links

Closing access to the traditional *haats* that now lie across the Bangladesh border has also been a great loss for the people in the southern Khasi hills, Kharmujai tells me. "The people here were once very prosperous because of trade with people from the plains further south. But after partition and the creation of Bangladesh, their main trade route has been cut off and that's affected the local economy," he says.

Food, especially fresh produce, is scarce in the area now and has to be shipped in from Shillong. When we stopped for lunch at a small "fast food café" in a tiny village called Saitsophen, there were no greens on offer. Only noodles, eggs and *doh jem*— pig intestine mixed with onions, and a few basic spices like turmeric and cloves.

A way of life

The advent of the monsoon is, however, still cause for celebration. "Most of us are still cultivators at heart," explains Tirot Sohleh, a relative of the café owner. When the rains begin, people dance for two days to drive out bad spirits. And then it is life as usual, aided by umbrellas or huge woven bamboo hats. "For outsiders this kind of rain is heavy, but for us it's a just part of our lives," says Sohleh. "Landslides does make travelling difficult, and sometimes life comes to a standstill, but when it doesn't rain, our children fall ill."

With no top soil rainwater gushes downstream, leaking pipelines add to misery

On our way back, we stop by Sohra market hoping to catch some activity. The place is still largely empty, though the downpour has thinned quite a bit. Two old women at a vegetable shop tell me that this morning Sohra had received rain "like the old days." But it didn't last, not like their childhood days in the 1950s when they often didn't see sunlight 40 days at a stretch. Like Syiemlieh in Tyrna, they too believe everything is upside down now. ■

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Enter social matrix

Computer games simulate society

ROHAN K GEORGE

Video games have long been a subject of controversy for critics, consumers and parents. They have been accused of desensitising children to violence and emphasising that violent behaviour is acceptable. These are valid criticisms. Partaking in virtual violence does have a seemingly realistic feel to it. But it's an aspect that has also of late fostered a distinct characteristic to video games. With game pyrotechnics becoming more advanced, the virtual world has become an arena for social simulation. Computer games have discovered politics.

Programmers involved in the business of turning bizarre ogres, grenade launchers, and unidentified flying objects into computer codes, now find themselves puzzling over banana republics, inflation and political crises.

Take *Darfur is Dying* (www.darfurisdying.com) for instance. The first part of the game requires the player to choose a member from a family of eight (from the father, Rehman, to the youngest child, Deng, aged 10) to collect water from a well near the village. The child must first find the well, taking care to avoid the Janjaweed militia. Success ensures entry to the second part of the game, where the player uses the water gathered from the well to manage resources in the refugee colony. The game was developed by students of the University of South California for the Darfur Digital Activist Contest, organised by the television channel mtvU, the Reebok Human Rights Foundation and the International Crisis Group.

Other games, such as *Oil God* (http://www.shockwave.com/gameland/oilgod.isp) and the *MacDonald*'s game (http://www.mcvideogame.com) focus on environmental destruction, oil wars or even the fast food culture. The Macdonald's game, developed by the Italian game company, Molleindustria, gives players control over all aspects of the MacDonald's corporation.

In each zone of activity, the player is introduced to the morally ambiguous decisions that the multinational food conglomerate is required to make profits. Its fields are located in San Jose, Argentina, and increasing grazing lands require clearing rainforest, maybe even razing a village. A municipal corporator has to be bribed and cows fattened with hormones to increase the burger supply. Public relations people have to be deployed to manage pesky special interest groups offended by the multinational's actions. And, then children have to be attracted with devious advertising campaigns. The game's satirical tone ensures that at every point, you know the actual impact of your decisions: overgrazing, for example, kills farms forcing the razing of more rainforests. But then moral compunctions have to be suspended for the sake of profits.

Another variety of games tries to educate players about managing emergencies. The *Stop Disasters Game*, (www.stopdisastersgame.org/playgame.html), produced by the UK-based game company PlayerThree for the UN International Strategy for Disaster Reduction casts you in the role of a town planner with limited time to prepare five different disaster scenarios—flood, hurricane, tsunami, wild fire, earthquake. To mitigate the effects of a tsunami, you could install breakwaters along the coast of a town. However, breakwaters damage the local ecology . So you may be better off protecting the coral reefs that provide natural protection against tsunami attacks. Towards the end, disaster strikes and the way you've prepared for it determines how many die, how many are rendered homeless and how fast the economy of the region can recover.

The messages can also be retrogressive. For example, in *Ethnic Cleansing: The Game* (http://www.resistance.com/ethniccleansing/catalog.htm), the player is cast in the role of a white supremacist, gunning down blacks, Hispanics and Jewish people. Although the reviewer did not get a chance to actually play the game, reviews on the game's website said "This will touch the hearts of thousands of White people because it's not intellectual: it's entertainment. Every young elementary school kid who plays this game will have visions of killing Ariel Sharon while sitting in class! When their history teacher asks the class if they've ever heard of Israel or Ariel Sharon, the White kids certainly will have." The game was developed by the US-based white supremist record company, Resistance Records.

Games have been used to educate people in the past, but not with such political overtones. And never with such spotlight on the player. This has led many to argue that an insidious individualism is fostered at the cost of dehumanising characters in the game—the child in Darfur, for example, is an object and not a sentient being.

With a generation increasingly dependent on the virtual world for entertainment and information, it will be interesting see these games take. ■

GAMES HAVE BEEN USED TO EDUCATE PEOPLE IN THE PAST, BUT NOT WITH SUCH POLITICAL OVERTONES

The greatest betrayal

US Food and Drug Administration is a handmaiden of drug giants

STEPHEN FOX

Never before in human history has food chemistry been so precarious for the health of billions. This stems from multinational corporate biochemical mayhem going unchecked by regulatory bodies in every nation, the worst being US and China'.

This crisis is worsening, demonstrated by the US Food and Drug Administration's (FDA's) failure to detect melamine in wheat and rice gluten imports from China meant for use as pet food additives. The failure has already claimed at least 4,000 pets. Moreover, the failure to prevent imports of diethylene glycol, the fake glycerine from China added to medications as a sweetener, has killed hundreds, especially children, from Panama to India to Bangladesh.

These cases, however, pale in epidemiological comparison with the harm done by neurotoxic and carcinogenic food additives. My own theory is that melamine, not normally very toxic, became poisonous when mixed with cyanuric acid in the bottom of the vats in China, a theory also advanced by Richard Goldstein of the Cornell College of Veterinary Medicine.

Food-flavouring workers in California were recently diagnosed with bronchiolitis obliterans, a rare and life-threatening lung disease also called popcorn workers' lung. Studies incriminate a chemical used in artificial butter flavour, diacetyl. Flavouring manufacturers have paid more than US $100 million as a result of lawsuits by people sick with the disease over the past five years. One death has been confirmed among workers; how many have gone undetected in the general population?

Public relations

Lawsuits against Pfizer and Zoloft have resulted in FDA requiring antidepressant manufacturers to add suicide warnings to their products, a belated public relations gesture. The normally unflappable Andrew Von Eschenbach, commissioner of FDA, recently appointed a new assistant commissioner for food safety and security, David Acheson. A graduate of the University of London Medical School, Acheson has participated in FDA discussions about the fact that heating french fries to 220°C transforms the starch into the carcinogenic acrylamide. (In 2003 and 2004, the then attorney general of California tried to label french fries as containing a chemical known to the State of California to cause cancer over the objections of the fast food lobby and FDA Commissioner at that time).

Rosa DeLauro, Connecticut Democrat and senior member of the House Appropriations Committee, has, however, blasted Acheson's appointment as a "reshuffling of management" doing little to prevent future outbreaks. "What is needed is a strong enforcement authority that would require mandatory recalls of contaminated products and a commitment to follow through with safety investigations," DeLauro said.

The pet food malaise has shown people, including those at the highest levels of the administration, that things need fixing. David Kessler, who served under both George H W Bush and Bill Clinton, noted that major improvements are needed from Congress, the industry and FDA. He said FDA needed more money for food safety efforts.

More money for more experts? Was Kessler joking? We wantonly add chemicals to almost all food, always for superficial appearance or taste. Sodium hexametaphosphate is added to potatoes. Sodium erythorbate, Sodium nitrates and nitrites BHQ, BHA, and BHT, some of the chemical relatives of embalming fluid routinely added to meats and manufactured food products, result in cancers from heated carcinogenic nitrosamines.

Artificial sweeteners are made by adding chlorine to sugar (sucralose/splenda) or aspartame, metabolised as methanol and formaldehyde. Mercurial fungicides are added during transport of coffee beans, and the coffee is mixed with chemicals like artificial sweeteners and nondairy creamers, or even just the regular old recombinant bovine grown hormones, found in 99 per cent of milk in USA. All this is done at higher temperatures which release the proven brain tumor causing *diketopiperazine* from aspartame molecule.

Cases of diet sodas are shipped to West Asia, stored out in the sun at 48°C degrees. Are you then surprised when the troops drinking these come home with neurological impairments conveniently dubbed the Gulf War Syndrome? Are you surprised when children drinking sodas for breakfast and having, for lunch, junk food doled out by the federally-funded school lunch programmes, develop attention deficit hyperactivity syndrome, or worse genetic afflictions like autism? Or when they fail academically or develop criminal pathologies at an early age, and develop adult diabetes at the age 10?

Even tiny incremental steps to correct even one of these problems are met with a solid wall of bureaucratic intransigence and corporate lobbying. For example, at the New Mexico legislature between 2005 and 2007, it became quite absurd to talk to senators about the obvious need to prevent aspartame from harming our children, while six out of nine of them were obliviously guzzling Diet Coke.

SHYAMAL

The renegade

Once, I had hopes from FDA commissioner Von Eschenbach, a cancer survivor who proclaimed intentions of ending the disease by 2015. However, every time he was contacted by aspartame victims, physicians treating aspartame poisoning, activists, or even state and national senators, he either ignored them or came out with corporate pleasing lies. In a letter responding to 21 New Mexico legislators asking for annulling the approval to aspartame, Von Eschenbach said FDA was not presented with credible scientific evidence. But just Google Ramazzini Oncology Foundation, Russell Blaylock, Betty Martini: there is much on the evidence that Von Eschenbach has ignored.

And Acheson? At best, he is another gutless apparatchik appointed to appease our increasingly angry public, but not rock the boat of grander administration and corporate-driven schemes. Acheson has thus far obtained ringing endorsement from the Grocery Manufacturers of America, who count on him to do nothing to correct the harm done by the chemical feast called mainstream American cuisine.

Emulate China?

Despite China's draconian lack of civil liberties, once in a great while there is appropriate judicial action. Zheng Xiaoyu, the ex-head of China's FDA, was sentenced to death for accepting US $832,000 in drug company bribes. The US is in the middle of a drug and food safety crisis, which has global repercussions. How then does Von Eschenbach, gets his "get out of jail" card"?

Henry Waxman, chairperson of House Oversight and Government Reform recently asked Von Eschenbach to testify on failure to warn Americans of the cardiovascular risk of death from Avandia—a diabetes drug made by GlaxoSmithKline. Statistics from the company's own research predicted that 35,000 people would die taking Avandia last year. FDA chose to ignore these. The hearing was scheduled in the wake of a report in *The New England Journal of Medicine* that linked Avandia to increased risk of heart attacks.

Avandia problems are the tips of the iceberg. Collusion with the very industries that FDA is supposed to regulate has reached staggering proportions, during the Bush administration, resulting in deaths and injuries to millions of Americans. For example, in case of the antibiotic KETEK, which FDA approved with the knowledge that it would injure children, Von Eschenbach threatened scientists of the institute who spoke out. Iowa's Republican Senator Charles Grassley stated: "It looks like FDA caught the drug company red handed and let them get away. It continues to cite a discredited safety study as a principal reason to feel okay about this drug."

However, don't conclude that FDA is incompetent. Its scientists routinely warn the directors of problems, who then intentionally decline to protect consumers. Gains of drug companies are placed ahead of human health. FDA fails to act, partially because its employees are jockeying for high-paying jobs in the industry that is being regulated.

The top priority of FDA and Von Eschenbach is to bring new biotech drugs to the market with minimal safety testing and then use them in clinical practice. Something like experiments in Nazi concentration camps, this is called the Critical Path Initiative. His lofty proclamations of ending cancer by 2015 notwitstanding, Von Eschenbach is seen by FDA critics as an oncologist who wants to create a cancer industry in which nobody is ever cured; only subjected to more expensive medications, indefinitely. Von Eschenbach led this effort for many years in Bush I's C Change, a group smoothing the development of big biotech drugs for profitable cancer "treatment." Tommy Thompson, then head of health and human services, approved a waiver allowing Von Eschenbach to remain at C Change while he headed the National Cancer Institute, the worst conflict of interest imaginable. In October 2006, Von Eschenbach was appointed to head the FDA, holding three positions.

Senate Bill S. 1082 and House bill HR. 1561 on the anvil of US' legislators could result in sweeping FDA reform. Or would they? Buried within this legislation is an attack on dietary supplements. These have always been challenged by FDA because they are safer and more effective than drugs. FDA acts as a police-force bully to keep Americans ignorant about proven homeopathic cures.

What will it take to rouse the US public from their state of catatonic indifference? ■

Stephen Fox is a US-based activist who takes on issues related to food safety and public health

FILM>> **Sicko** • Produced and directed by *Michael Moore* • 125 minutes • USA

Bad place to be sick

VIBHA VARSHNEY

Michael Moore has penchant for turning polemics into cinema. And good cinema at that. His first film, *Roger and Me*, delineated the economic plight of small US town in the wake of General Motors' decision to close down its factories there. His next target was the gun lobby in *Bowling for Columbine*. With *Fahrenheit 9/11*, Moore questioned whether US President George W Bush might have had a hidden agenda in waging war on Iraq. The agent provocateur of modern cinema has now trained his camera at the US health care system. His new film, *Sicko*, is ostensibly directed at the American audience, but it has a lot of relevance for people in developing countries who have become targets of private insurance companies. In India, for example, many of these companies hard-sell the American insurance model.

Adroit use of footage makes Sicko a compelling film, that is sure to provoke outrage and elicit debate

Sicko will scare or at least remove the blinkers of those enamored by this model. It's nauseating stuff. Getting insurance money actually involves reading a lot of fine print, and getting past a lot of red tape, the film shows. The film presents several moving sagas of Americans who suffered medical calamities, and sheds light on their care, or lack thereof, based on the actions of private health-insurance companies. Sample this. A nine-month-old girl going deaf was allowed a transplant only in one ear, because the insurance company considered the treatment experimental. Another patient had her reimbursement cancelled after the insurance company found that she had not disclosed a minor infection in her application form. "Pre-existing condition does not qualify for insurance and the list of these conditions is so long that it could wrap around a house," says a former insurance company employee interviewed in the film.

A number of insurance industry employees interviewed by the director remark that they get incentives on the basis of the number of cases they help deny reimbursements. That is exactly their job, insurance companies claim. It also makes business sense for an insurance company to deny as many claims as it can.

Don't be poor and sick

Moore makes it abundantly clear that the US is a very dangerous place to be if you are poor and sick. Insurance company strictures meant that a patient was denied all medicines that needed to be given intravenously—it was the only way she could have been administered the drugs. Another was told that her condition was not life threatening—she died of this condition in a couple of years. Another woman was told that she did not have a tumour though diagnostic tests suggested so.

Moore then shows the health-care systems of Canada, England, France and Cuba. He busts a lot of myths about the systems, such as overcrowded waiting rooms. He blames politicians for perpetuating the myth. He uses an interesting example to make his point. Moore takes a flotilla of ill people—9/11 sufferers—to Cuba a country with a strong public healthcare system.

Though he probes a vitally serious subject, Moore eschews pedantry—clever use of footage and interviews of well-chosen subjects make *Sicko* a film that will arouse much outrage and evoke a lot of discussion.

Moore's wide-eyed admiration of the public healthcare system in Canada, France, England and Cuba could be an exaggeration, as many critics have held. Does the fact that he is trying to improve matter justify his means? If nothing else, it lays the ground for improving the public healthcare system instead of completely writing it off. What it needs is adequate investment.

And does insurance have a role in public health system? Let's take the case of France. Here people take private insurance to cover the cost of treatment. But treatment is still provided through the public health system.

Sicko will come as an eye-opener for all those who feel that paying insurance premium on time will assure them treatment. Insurance does not cover everything and even if conditions are covered, there are many ifs and buts. ■

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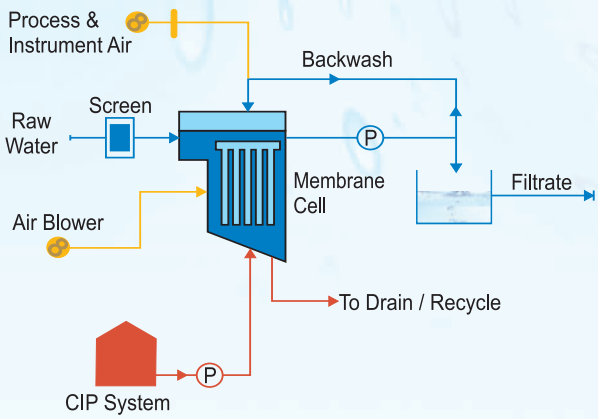

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DOCUMENTS>> MINING • Borneo / UK

Cast in open

BHP Billiton, the world's biggest mining company, is planning to raze some of the great apes' rainforest habitat. The company is known to be an ardent supporter of the widely-watched BBC programme, *Saving Planet Earth*. The *Sunday Times* has uncovered documents that reveal the Anglo-Australian mining giant's plans to exploit mining rights in large swathes of tropical forests in Borneo. Billiton, which is known to wear its green credentials on its sleeves, has lobbied for ending the protected status of some of these areas so it can clear the trees and dig for coal.

Miners aren't friends for orangutans

The company has in the past supported work to help save Borneo's orangutans. But the documents reveal Billiton's plans for an open cast coal mine less than 3 km from where orangutans live. They show it has concessions for mining in hundreds of thousands of acres of the rainforest.

David Chivers of the Wildlife Research Group at the Cambridge University, said: "This is going to be a belt of mines right across rainforest. It will drive out wildlife and will be a disaster for the island." Billiton insists it will only mine in permitted zones and use sustainable practices but the British government is concerned by the lobbying to revoke protected status of parts of the rainforest. Barry Gardiner, British prime minister Gordon Brown's special representative on forestry, has sought a parliamentary debate on the issue.

Farah Sofa, deputy director of Walhi, an Indonesian environmental group, said: "BHP Billiton is a climate dinosaur. A deluge of base camps, roads, and open-cast pits would eat the heart of this island from inside out." ■

ONLINE SLANDER>> ORGANIC FOODS • USA

Dirty mischief

John Mackey, head of US organic foods group Whole Foods Market, is being investigated for posting messages on the Internet about a rival company. He used a pseudonym to make comments about Wild Oats, a firm Whole Foods is hoping to buy in a US $565 million deal.

Finance watchdogs are now investigating the posts, while Whole Foods itself has begun an independent inquiry. Mackey has apologised for his "error" in the wake of the news. Mackey—who helped set up the Texas-based company in 1980—admitted he was the person behind the postings on Yahoo's financial message board between 1999 and 2006. While some of his posts—made under the name 'Rahodeb'—praised the company, others claimed it was overvalued and poorly run. The identity of 'Rahodeb' emerged in mid-July this year when the online notes were handed to the US Federal Trades Commission as part of a government examination of the Wild Oats takeover. ■

ILLUSTRATIONS: SHYAMAL

NEWS SNIPPETS

>> RCTV, the opposition-aligned Venezuelan TV station forced off the air by the country's president Hugo Chavez, has resumed broadcasting on cable and satellite television. The station was off air since May 27, when Chavez granted its open airwaves signal to a state-controlled channel.

>> Botswana's government has come to the defence of *Top Gear* after the BBC motoring show was accused by environmentalists of damaging the famed Makgadikgadi salt pans during filming. This has attracted much ire from NGOs. Mary Rice, head of the Environmental Investigation Agency, which conducts conservation projects in Botswana, said *Top Gear* "could lead to many boy racers driving on the rare wonder".

MUSIC FESTIVAL>> RACISM • Congo

Bad host

A pan-African music festival held in the Congolese capital of Brazzaville has aroused much outrage from civil rights groups for making 22 pygmy musicians stay in a zoo. Organisers of the week-long music festival, which ended on July 14, told the media that they had hoped to recreate the natural habitat of the pygmies by housing them in a zoo. Other musicians playing at the festival were provided hotel rooms.

The pygmy musicians said they had expected to be housed properly. It is the fifth year they have performed at the festival and previously they have been treated the same as other guests.

"We can't live here. There are lots of mosquitoes here. In the city we can't stay in a forest," one of the musicians David Motambo told BBC. Roger Bouka Owoko from the Congolese Observatory of Human Rights said the pygmies had to collect firewood in the zoo to cook their food, and were being stared at and filmed by tourists. After the outcry, the authorities shifted the musicians to a local school. ■

Small beginning to aboriginals' TV

TELEVISION>> ABORIGINALS • Australia

Different strokes

Australia now has a national television station to promote the culture of its indigenous people. The National Indigenous Television (NITV) was launched in Sydney on July 16.

The service will start off small, broadcasting to around 200,000 people and without a news service or a current affairs programme.

Nevertheless, many artists from the aboriginal community are excited about having an outlet for their work. "It's going to be a television service that's produced and directed by indigenous people, that will seek content from indigenous communities around Australia and some indigenous content from overseas," said NITV's chairperson Larissa Behrendt.

But remote communities apprehend exclusion. The general manager of Warlpiri media in Yuendumu Northern Territory, Rita Catoni, says many cultural videos might not be picked up by NITV because they are not up to industry standard. "What's not going to be around is...a platform for a lot of people in remote communities to view their own grassroots content," she said. ■

HANDBOOK>> RADIO • Bangalore

Help to air

Radio is the most ubiquitous piece of technology in the country. But opportunities afforded by this handy medium are not been utilised to their optimum by NGOs, according to the Bangalore-based NGO Communication for Development and Learning (CDL). To help NGOs tap the scope of the medium, the organisation has now produced a handbook, *Working with the Radio*. The handbook aims to "demystify" radio. Priced at Rs 100, it has sections explaining the working of a radio station, and how to make radio programmes. According to CDL, "radio which reaches more than 90 per cent of the country's geographical area and 99 per cent of the population, ought to be the preferred medium for NGOs". "Why this is not so can be explained by our notions of the radio as being a mysterious and highly technical medium that is cloistered behind high walls," says organisation's executive director Shangon Das Gupta. ■

THE WEB>> ADVOCACY • China

Mixed results

Officials in the Chinese city of Xiamen were forced to suspend plans for a paraxylene plant, after the town's residents organised a digital campaign that included blog posts, online signature campaigns and the distribution of nearly 1 million text messages. Paraxylene is a polluting, carcinogenic petrochemical used in the process of making polyester film, packaging resin and fabrics. Health experts say it can cause foetus abnormalities.

Though officials finally suspended the plans, the Xiamen city government subsequently created draft rules for Internet usage that require users to identify themselves by their real names. Conflicting explanations for the new draft Internet rules abound. There is the brutally honest statement by the deputy head of the municipal Industry and Commerce Bureau, Tian Feng. "After the opposition (to) the PX project, the (city) government felt that it should have some control over web content," he said.

Some officials, however, completely deny any relation between the chemical plant and the regulation. Among those who have denied such an association is Lin Congming, vice propaganda chief of the Xiamen Communist Party Committee. Congming noted the regulation was only a draft. ■

ONLINE

www.dasani.com

PURE HYPE

This website is prefaced by a question: "What makes your mouth water?" Before you have a moment to think, the answers come thick and fast. "The crisp taste of Dasani. Delicious Dasani flavours…Each Dasani product is enhanced to deliver a mouth-watering experience." There is an exegesis on a "vitamin-enhanced" variety. Dainty posters to download besides.

Coke's bottled water brand has faced much flak in recent times. The soft drink major is often gratifying target for journalists in that it trades heavily on brands. But the brouhaha is not just media imagi-

When in bad waters step up PR: Dasani

nation. In 2004, its seven million pound marketing drive for Dasani came a cropper after Coke was forced to withdraw its bottled water from the UK when investigations revealed that the product had no "value additions" as was widely advertised. Dasani was just tap water. The brand's launch in France and Germany was also annulled.

Distribution matters

PDS fails in feeding India's poor

■ India's Targeted Public Distribution System (TPDS) gives subsidised essential commodities to economically weaker households. Till 1997, the system had supplied subsidised commodities to all

■ Households under TPDS are classed as Below Poverty Line (BPL) and Above Poverty Line (APL) groups based on income. BPL is further divided into BPL and Antyodaya scheme which targets economically weakest people

■ Other food assistance programmes are Food for Work, Annapurna Anna Yojana (AAY), Integrated Child Development Scheme and Mid-day Meal. Estimates show households with more than 0.4 hectares (ha) benefit more from the schemes

■ Subsidies for APL families were eliminated in 2000. Under TPDS, about 50 per cent subsidy (against government's procurement cost) is given to BPL families. Antyodaya gives even higher rate of subsidies

Trends

● Under TPDS, 81 per cent of rural and 67 per cent of urban households have ration cards. Over 26 per cent households in rural areas and 10.5 per cent in urban areas have BPL cards

● Households with less than 0.01 ha do not have ration cards. In Andhra Pradesh, 28 per cent of the rural households does not have ration cards. This is 29 per cent in Chhattisgarh, 23.2 per cent in Jharkhand and 33 per cent in Orissa—states with high tribal population

● In 2004-05, over 40 per cent of the households dependent on agriculture and 32 per cent of households dependent on other labours held BPL cards. Five per cent of the agricultural labour households and four per cent of other labour households had Antyodaya cards

● 40 per cent of BPL cards are held by scheduled tribe households, 35 per cent by scheduled castes, 25 per cent by other backward classes and 17 per cent by others

● Number of households with ration cards is highest among the self employed; about 11 per cent of them hold BPL cards

Subsidies up; welfare down

	1997-98	2001-02	2002-03	2003-04	2004-05	2005-06
Food Subsidy in crore Rs	7,900	17,612	24,000	27,000	29,000	23,500
TPDS & AAY*	16.98	13.84	20.09	24.2	29.4	31.4
Other welfare schemes*	2.08	8.86	11.38	13.5	10.6	7.4
Open market sale*	0.06	5.6	5.66	9.66	0.25	
Subsidised exports*	0	4.7	12.46	10.31	1	

*millon tonnes

● The poverty line for rural India is at Rs 356 a month. In households that fall at the bottom of the Monthly Per Capita Expenditure (MPCE) category (below Rs 235), 41 per cent hold BPL cards. In top three MPCE classes—Rs 690-890, Rs 890-1,155 and Rs 1,155 or more—18 per cent, 14 per cent and 11 per cent respectively hold BPL cards

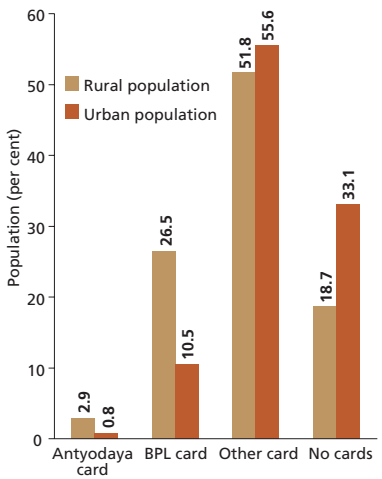
Chinks in the chain

● 58 per cent of the subsidised food does not reach BPL families. 22 per cent of the food meant for the poor reaches APL families and 36 per cent is sold in the black market

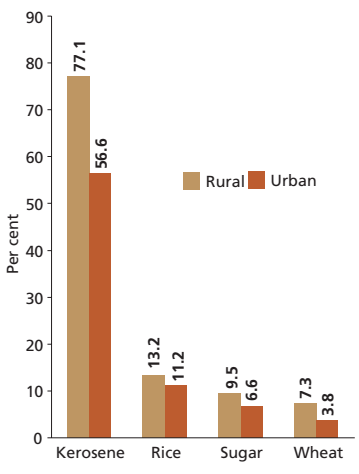
● To transfer food worth a rupee, the government spends Rs 3.65. The fair price shops are not viable, prone to food leakage

● Faulty targeting, ghost cards, unavailability and low-quality food dog PDS

Card holders countrywide



Consumption pattern



Source: NSS Report No. 510: Public Distribution System and Other Sources Of Household Consumption, 2004-05

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For additional information please contact Philippe Vaneberg by email pvaneberg@intercooperation.ch or by tel. + 41 31 385 10 10

Applications with CV and letter of interest should be submitted electronically to Intercooperation,att. Ms. Eliane Fistarol, eliane.fistarol@intercooperation.ch with mention “NUHDA application”

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