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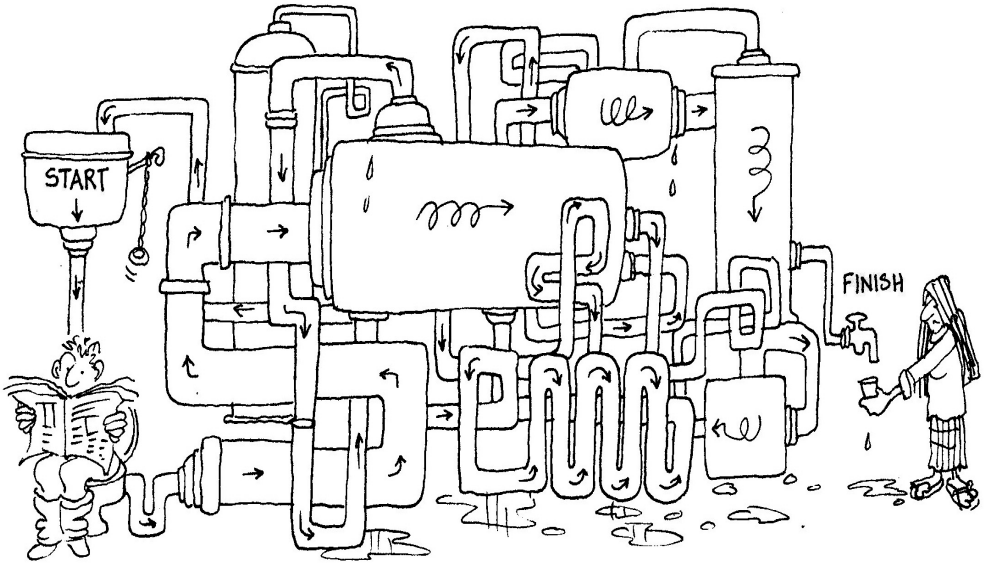
Dependence on groundwater pushes Andhra farmers to debts, often suicides



Keshav Kumar of Mahabubnagar has three hectares and four borewells, but cannot irrigate land

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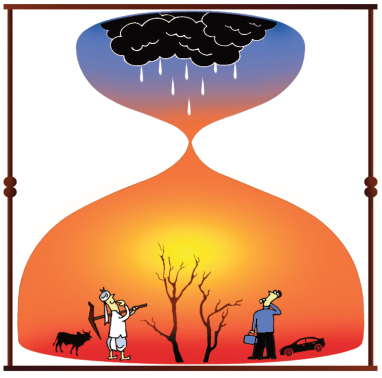
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What monsoon means

There is one being-Indian-thing, which spans the urban-rural and the rich-poor divide: our annual watch and wait for the monsoon. It begins every year, without fail as heat climbs and the monsoon advances. The farmers wait desperately because they need the rain at the right time to sow their crops. The city managers wait because by the beginning of each monsoon period, the reservoirs that supply water to cities are precariously low. All of us wait, in spite of our air-conditioned living, for the relief rain brings to the scorching heat and dust. This is perhaps the only time when the entire country is one in desperation. It cannot exhale till it rains.

But even as I write this several questions come to my mind. How much do we really know about this phenomenon so important in every Indian's life? Do we know why it rains? Do we know that scientists are still squabbling about the definition of monsoon? The only one they have is seasonal winds, which have regular directions, and they get flummoxed when this changes. Do we know our monsoon is a truly globalised phenomenon. It is integrated and linked to the ocean current in the faraway Pacific, the temperature of the Tibetan plateau, the Eurasian snow and even the freshwater content in the Bay of Bengal. Do we even know who the monsoon scientists are in India and how they are desperately learning to chase this unpredictable and variable event better? We don't. We have been taught some of the science in school, but never in real life. It is not part of the usable knowledge, what we think we need to know to survive our world of today. But we are wrong.



The grand old man of the Indian monsoon, the late P R Pisharoty, would have told you that this annual event brings us rain in just about 100 hours in the 8,765-hour year, which means it is our challenge to manage it well. Environmentalist Anil Agarwal would have explained the monsoon shows how nature uses weak forces rather than concentrated forces to do its work. Just think: it takes a very small temperature difference to carry as much as 40,000 billion tonnes of water from the oceans across thousands of miles to dump it as rainfall over India. This lack of knowledge of nature's ways is at the core of the environmental crisis, he would say.

Consider again: we use concentrated energy sources such as coal and oil that have created enormous problems like local air pollution and global climate change. If we understood the ways of nature, we would shift to weaker sources of energy like solar or move to using rainfall, not wait till it is concentrated in rivers and aquifers. "Humans have come to rely much more on concentrated water sources like rivers and aquifers in the past 100 years. But heavy use of these sources is leading to their overexploitation. In the 21st century, human beings will once again move to weaker water resource like rainfall," said Agarwal. In other words, the more we understand the monsoon, the more we will learn how to move from unravelling nature to imitating it for sustainable development.

Another question I have is: how much do we know how to live without the monsoons? I am sure you have heard it said that very soon we will be 'developed', and that would mean we would no longer be 'dependent' on this crazy national obsession called the monsoon. Let's be clear this is not going to happen in a hurry. After 60-odd years of Independence and after considerable investment in surface irrigation systems, the bulk of Indian agriculture remains rainfed. This means farmers are at the mercy of this capricious and undependable God. But this is not even the full picture. What is not said is that between 60 and 80 per cent of the irrigated area is watered by groundwater, a resource, which needs the rain to recharge its supply. This is why every year as the monsoon progresses from Kerala to Kashmir or from Bengal to Rajasthan, hearts stop beating if it halts, slows or dies. The words low pressure and depressions are part of the Indian lexicon. The monsoon is and will remain India's true finance minister.

Therefore, I believe, instead of wanting to reduce dependence we should celebrate and deepen our engagement with the monsoon. Our monsoon lexicon must expand so that we harvest the rain—every drop of it where and when it falls. This must be the national obsession, treasuring the value of each raindrop. We must build a water future based on decentralised systems—check dams, lakes, ponds, wells, grasses and trees, everything that can slow the journey of rain to the oceans.

If we can do this, we can answer my last and most painful question. How should we live and celebrate the rain that falls in our cities and fields? Today, we cry when it does not rain and weep when it does because rain brings floods and disease in fields and traffic jams in cities. Just think of the devastating cycle of water stress and floods we witness each year without fail and with increasing ferocity. The only way to change is relearn the art of living with water that falls every year.

The monsoon is part of each of us. Now we have to make it real. ■

—Sunita Narain

SCIENCE AND ENVIRONMENT FORTNIGHTLY

Down To Earth

JULY 16-31, 2010

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extra



In their desperate search for water, Andhra Pradesh farmers are burying themselves in debt while depleting the groundwater. Watch stories from the field



INTERVIEW

Water-expert James G Workman talks about his book *(Heart of Dryness)* and the quest for quenching the world's thirst

BEHIND THE LENS

Three DTE photographers recount their experiences of covering Bhopal

Audio Slideshow



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ARCHIVE

DON'T SPARE GOVERNMENT AND JUDICIARY



KALPANAA

What can one expect from the government that presided over the Bhopal gas tragedy without offering much relief for a quarter century ('The Bhopal legacy: reworking corporate liability', June 16-30, 2010)? I wonder why no one in the government thought of decontaminating the pesticide factory and awarding compensation to the victims soon after the incident in December 1984. That would have saved some of the 27,000 people who died from gas-related diseases in the subsequent months.

The Government of India and the judiciary are as culpable as Warren Anderson and other officials of the Union Carbide for the mass suffering.

RISHUB RAINA
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✉ Why was Warren Anderson, who was the chairperson of Union Carbide at the time of the gas tragedy, allowed to leave Bhopal after the incident? It will not be wrong to equate him with the Nazis who killed millions of Jews in gas chambers.

SHYAMAL CHAKRABARTI
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✉ Look at the language the US President Barack Obama used against British Petroleum (BP) after the Gulf oil spill even though only 11 people died in the accident. And see the language used by the Indian government for the Bhopal gas tragedy where 2,500 people died overnight and more than 100,000 were maimed.

VANI RHIMJHIM
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✉ People's anger towards the government over the Bhopal judgement is understandable. Will the government accept its failure in delivering justice to the victims, which, of course, started during the regime of former prime minister Rajiv Gandhi? Arjun Singh is just being made a scapegoat.

SANTOSH GANDHI
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✉ The court verdict in the Bhopal gas tragedy was a crime and a travesty of justice. It has shaken people's faith in the judiciary. It will encourage corporates to play with the lives of people.

K MISRA
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✉ Keshub Mahindra ought to have known that Union Carbide India Limited (UCIL) was dealing in hazardous chemicals for making pesticides before he became the non-executive chairman of the company. Therefore, his statement that he merely attended the board meetings for a paltry Rs 250 per sitting does not hold water. Some corporate lobbyists have argued Mahindra had no residence or business activities in or around Bhopal, so he should not be held responsible. Was Osama bin Laden in New York at the time of 9/11? How can anyone believe that the former UCIL chairperson had no knowledge of the presence of any lethal chemicals in the factory? The case of Bhopal gas tragedy was indeed treated like a motor accident. The judiciary failed to book Mahindra under Section 304(II) of the Indian Penal Code (punishment for culpable homicide) due to his political clout, financial power and good liaison work by his corporate office. The Supreme Court should initiate a *suo motu* action against him. The industry


SAYANTAN BERA / CSE

Unsung heroes of Bhopal

While fighting for justice with the government and industrial giants, no one bothered to appreciate those who made the lives of Bhopal gas tragedy victims bearable.

No one remembers the youngsters who took the responsibility of delivering letters and messages in the gas-affected area; the auto-rickshaw drivers, government employees and common people who served the people suffering from toxic gas-related diseases; and the doctors, medical students and paramedics who treated the patients. These real heroes did not get the media attention they deserved.

KAUSHAL KUMAR
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associations and chambers of commerce are all distancing themselves from this manmade disaster which can be termed as the most cruel genocide in history.

Had this happened in any other country, all the accused would have been sentenced to death or given harsh jail terms. If the media could open doors of justice for Ruchika, Jessica Lal and Rizwanur Rehman, it should not fail in this case where 25,000 people were killed and tens of thousands are still suffering.

ASHOK MAJUMDAR
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✉ I liked the new look of your website *www.downtoearth.org.in*.

In response to the editorial on Bhopal gas tragedy, Dow Chemicals should have been made to compensate the Bhopal gas victims in the manner it would have for a similar tragedy in the US.

VARUN SEEMA
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✉ What kind of a verdict is this which came a generation after the disaster? What kind of relief will it bring to the victims' families? It is a cruel joke on the victims' families to debate the effects of the judgement on the Indo-US ties.

RITIKA DESAI
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✉ It is a shame that the worst industrial disaster took place in the world's biggest democracy. Even after more than 25 years, our leaders are busy in cover-up operations in the name of clean-up.

MUSKAN TANEJA
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✉ People blame the US for its double standards in dealing with the Bhopal gas tragedy caused by Indian subsidiary of the American company Union Carbide and the Gulf oil spill caused by BP. But US President Obama's different approaches show how sensitive he is about matters relating to his own people who died on the drilling rig or are affected by the oil spill. His statement, "whose ass to kick in BP", shows he is ready to step beyond the law. The Indian government (particularly the Congress) bows to the wishes of the US government over the deaths of tens of thousands of people.

S R GANGULI
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✉ The government punished Union Carbide officials and people are demanding the extradition of Warren Anderson because of the massive casualties in the Bhopal gas tragedy. What about the owners of private factories where workers die due to poor safety measures? Are they not accountable?

No industry should function at the cost of human life.

ARVIND NOGIA
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PICK OF THE POSTBAG

Fix risk liability

Industrial disasters are no acts of god and so, disaster liability must be linked to accountability to give meaning to the right to life guaranteed by the Constitution. Disaster management can become effective only if prevention and mitigation are made a part of risk management liability. We have the Factories Act of 1948 under which the government has certain responsibilities besides the occupier and operator of the factory. The laws provide district officials with ample powers to inspect and take preventive actions. But even now we are talking of liability for relief and rehabilitation rather than liability for risk management.

We must remember that the goal of disaster management should be zero tolerance and prevention rather than just response and relief.

The Environment (Protection) Act of 1986 and the rules on hazardous chemicals, hazardous waste, and emergency response talk of authorization, consent and planning for disaster response. None provide for liability of risk control or management.

The proposed Civil Liability for Nuclear Damage Bill must be preventive in approach, not curative. Consultants offering risk management services, and impact and vulnerability assessments should also be made liable.

Moreover, the tools of assessment, planning and monitoring have to be evolved and standardized to determine accountability.

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EAST INSPIRES WEST

Use of toilet paper, particularly in western countries, is leading to a decline in forest cover. It is time to shift to water ablution as practised in southern Asia. The practice is cleaner and hygienic and also eliminates the use of toilet paper. Toilet paper manufacturers' will oppose the move, but then, every change has been resisted.

K G DAVE
Former Chief Engineer, Gujarat Water Supply and Sewerage Board, Gandhinagar, Gujarat

SHIFT CLIMATE TALK VENUES

Negotiations on how to reduce greenhouse gas emissions after the Kyoto Protocol expires in 2012 have failed repeatedly. The reason is that the high-level talks are organized in air-conditioned rooms.

Let the negotiation venue shift to open areas in low-lying islets of the Maldives, the sinking S underban delta in India or the flooded coastal areas of Bangladesh, which face dire consequences of climate change. These regions are not only home to rare species, they host the maximum number of climate refugees. Then only representatives of industrialized countries, who are repeatedly blocking the negotiation process, would realize the consequences of their actions.

RAJESH R SHENOY
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SAYANTAN BERA / CSE

RIGHT TECHNOLOGY IS THE KEY

The rush by industrialists to participate in the Jawaharlal Nehru National Solar Mission that aims to produce 22,000 MW by 2022 is a welcome step ('New gold rush', June 1-15, 2010). Its success will depend on using or funding the right technology. India should also promote technological innovations in developing solar-powered appliances, such as pump sets, street lights and washing machines. Architects should be given incentives to design solar powered buildings. This would drastically reduce the load on the grid.

JACOB SAHAYAM
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Down To Earth welcomes letters, responses and other contributions from readers. Send to Sunita Narain, Editor, *Down To Earth*, 41, Tughlakabad Institutional Area, New Delhi - 110 062.
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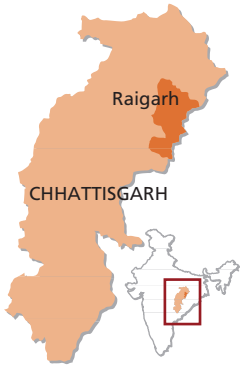
Jindal pays for flouting law

Constructs Chhattisgarh plant without clearance

SUGANDH JUNEJA *Tamnar, Raigarh*

JINDAL Power Limited (JPL), the power bigwig of the private arena in India, is making news. In the spotlight is the 2,400 MW expansion of the company's existing 1,000 MW coal-based thermal power facility at Tamnar village in Raigarh district of Chhattisgarh.

The Rs 13,410-crore project hit a roadblock on June 18 when the Union Ministry of Environment and Forests (MOEF) retracted the terms of reference (TOR) granted for the expansion. The environmental impact assessment (EIA) is done based on these TORs. The retraction came in the wake of a complaint from an NGO alleging illegal construction; illegal because the company did not obtain the requisite environmental clearance (see: *Attention, environment minister*).



Amid the characteristic red and white chimneys, cooling towers and the blue-and-white plant facility, there is a corner that does not quite fit in. Here the plant boundary is covered with black plastic sheets. No one is allowed near this area. This is where the alleged illegal construction of the proposed expansion took place.

On receiving the complaint, the ministry constituted an inspection team comprising officials from its regional office in Bhopal, Chhattisgarh Environment Conservation Board (CECB) and an ex-officer of Central Pollution Control Board (CPCB). The team visited the site on May 22 and found rampant construction for the proposed facility within the premises of the existing one. This is in violation of Section 2 of the EIA Notification, 2006.

Earlier, on February 22, the regional officer of CECB in Raigarh, A C Malloo, inspected the site and issued a notice to the company. "I asked them to stop all construction activity immediately," he said.

Bharat Rohra, senior vice-president, design and engineering at JPL, justified the construction: "We were only doing basic preparations. It took the ministry 18 months to organise a public hearing; we were losing time. We need to finish this phase of expansion by the 11th plan." The ministry files, however, indicate that the company has changed plans for expansion time and again leading to the delay.

MoEF retracted the terms of reference after allegations of illegal construction

Estimations, re-estimations

JPL applied for the expansion phase of the plant in April 2007, while the 1,000 MW plant was still under construction. The expansion was to be of 1,320 MW, adjacent to the 1,000 MW one. The land requirement was summed up as 750 hectares (ha), including 350 ha for the power plant, 300 ha for a dyke to store flyash and water reservoir, and 100 ha for the residential quarters. The TORs for this were granted in July 2007.

In August 2008, the company proposed another expansion of 1,600 MW in addition to the 1,320 MW, bringing the total expansion to 2,920 MW. The land estimation remained the same—350 ha for the plant. The proposal was granted TORs in December 2008.

The company revised the proposal once again in early 2009 and fixed the new expansion capacity at 2,400 MW. This time it estimated the land requirement to be 1,041 ha—491 ha for the ash dyke, 100 ha each for water reservoir and residential colony and 350 ha for



This JPL structure for the proposed expansion now lies dismantled and covered in mud

RAMESH AGRAWAL

the plant. Jindal Power received the TORs on March 31, 2009. The EIA was prepared based on this proposal.

The state government set April 5, 2010 as the date for the public hearing that follows an EIA and is mandatory for an environmental clearance. But JPL had begun construction on the expansion way ahead of the processes that precede environmental clearance.

Coal-rich plant site

A major part of the area where the expansion is proposed is in the coal-bearing Gare-Pelma Block I and belongs to Chhattisgarh Mineral Development Corporation (CMDC). The Union Ministry of Coal had granted the area to CMDC in 2006 for prospecting purposes. JPL went ahead with the proposal and construction of the new plant without waiting for a no-objection certificate (NOC) from CMDC. This is another violation.

In a letter to CECB, the mineral corporation confirmed the land belongs to it and that no project activity should be allowed there. The letter also mentioned that CMDC has already rejected JPL's plea for the NOC.

JPL reduced the area for expansion by one third, following a furore over the coal-rich site

Raigarh collector Ashok K Agrawal then issued an order: JPL was to submit an NOC from the mines department. Only then the public hearing could take place. S K Behar, state mining secretary, said Jindal Power should not have planned the plant in the coal-rich area.

JPL in the meantime made changes to the area estimations for the expansion. The revised layout did not require any of the coal-rich CMDC land. With the obstacles tactfully removed, the public hearing was conducted on May 8, 2010.

Considered one of the longest, it lasted 12 hours. According to Ramesh Agrawal of non-profit Jan Chetna, at the hearing there were three or four people who were in favour of the project. "People who were in support of our project were not allowed to talk. They were threatened when they tried to enter the premises," said P P Singh, executive director in charge of the expansion. Jayant Bohidar, independent activist, dismissed the allegation, "No one was stopped from presenting their view. The company-bought supporters could not come out in the open because there was strong opposition from people."

The new layout was not acceptable to the Union ministry as it detected a location change in the revised version. It has asked for a fresh proposal, which would imply new TORs and a fresh EIA. "There is no change in plant location; the company only optimised land use as per the TORs," Rohra said.

According to another new layout, JPL is proposing the 2,400 MW plant over 115 ha, as opposed to 350 ha in the 2009 proposal. About 62 ha of this land have already been acquired and the acquisition of the rest is under process. Ash dykes now require 241 ha instead of 491 ha proposed in 2009. Water reservoir and colony of the existing facility will now have to provide for the existing as well as the expanded capacity. "Since land is a problem in the region we thought of bringing down the land requirement," Rohra said. "Instead of appreciation, we have only got rebuke from the ministry," he added.

MOEF has directed the state government to take legal action against the company. "We are in the process of constituting a committee to have a round of inspection before taking further action," said the state environment minister, Rajesh Munat. Rohra said, if taken to court, JPL will try and convince the ministry that there has been no change in location. ■

How it unfolded

April 2007	Expansion by adding 2x660 MW	TOR granted in July 2007
August 2008	Expansion by adding 2x800 (in addition to earlier proposed 2x660 MW)	TOR granted in December 2008
Early 2009	Expansion by adding 4x600 MW	TOR granted in March 2009
February 2010	Regional Officer, CECB issues notice to JPL	Construction under progress
March 2010	Ramesh Agrawal of Jan Chetna files a complaint with MoEF	Alleges illegal construction at the site
May 2010	Public hearing conducted	Most speak in opposition
May 2010	MoEF constituted committee visits site	Construction still under progress
June 2010	MoEF revokes TORs on the basis of violation of EIA notification 2006	Construction on hold
June 2010	Centre asks state government to take legal action against JPL	Under progress

Attention, environment minister

Letter triggers action



Ramesh Agrawal of Jan Chetna, a non-profit, wrote to Union environment minister Jairam Ramesh on March 15, apprising him of the construction activity and urged the ministry to take legal action against JPL. "I found electric wire fencing, some base structures and foundation construction in full swing when I visited the site in November 2009," he said. Agrawal visited again in March this year to find construction activity still going on despite the notice from the Regional Office, CECB. "Today, JPL has broken down the structures they had built and have levelled the land using mud, sand and fly-ash," he added. Agrawal now faces charges of extortion filed by an officer from Jindal Steel and Power Limited, the parent company; the case was filed after JPL's terms of reference were withdrawn.

VIEWFINDER



REUTERS

RUSSIA FLOATS A NUCLEAR PLANT, LITERALLY

Nearly a quarter-century after the Chernobyl nuclear power plant disaster in Soviet Ukraine, Russia launched the world's first floating nuclear power plant in St Petersburg. The plant, built on a 144 metre-long barge, is capable of producing enough energy for a city of 200,000 people. Environmentalists say the government's plan to dot Russia's northern coastline with floating nuclear power plants is risky.

▸ An illegal **gold mine** collapsed on June 27 after heavy rains, burying about 100 miners in central Ghana. Search is hampered by flooding. Ghana is one of Africa's largest gold exporters. Illegal gold mines dot the country.

▸ South African fishers in Durban blamed the football **World Cup** for missing out on this year's sardine migration, which lures whales and sharks to the country's waters. The Durban council banned fishing to upgrade the seafront for tourists.

▸ A Chinese court sentenced a US geologist, Xue Feng, to eight years in prison on charges of disclosing **"state secrets"**, probably the locations of oil wells, to a US energy firm. In March, China jailed four executives of mining giant Rio Tinto for bribing its steel firms and stealing state secrets.

▸ Iran said the UK, UAE and Germany refused to provide fuel to its planes, following unilateral sanctions imposed by USA. The West fears Iran is building **nuclear** bombs. Iran says it is developing civilian nuclear energy.

▸ Under international pressure, Israel is easing blockade on Hamas-ruled **Gaza** and allowing consumer goods and timber. It continues to restrict the import of other construction material, which hampers rebuilding all that was destroyed in last year's war.

▸ The European Commission proposed to raise the **retirement age** to prevent the collapse of its pension system. With the increase of life expectancy and weak birth rates, people are living longer. This strains a system where retirees get pensions paid by workers, it said.

▸ The Swiss government launched a **green tourism** project, Alpmobil, to promote the use of electric vehicles by tourists in the Alpine. The authorities have set up 20 battery charge-points.

▸ Spain enforced a new **abortion law** that allows women to terminate pregnancies during the first 14 weeks or anytime during the pregnancy if the foetus is deformed. It enables girls of 16 and 17 to abort without parental consent. The Catholic Church is angry.

▸ In a six-year-old trade dispute between USA's Boeing and Europe's **Airbus**, the WTO ruled that the A380 super-jumbo project of Airbus benefited from illegal European subsidies.

▸ San Francisco became the first US city to require mobile phone makers to mention **radiation levels** on the handsets. It would show the amount of radio waves people can safely absorb into their bodies when using a mobile phone. Some studies link it to cancer, though there is no consensus.

▸ Canada announced from July 1 all foreign and domestic vessels travelling through its **Arctic waters** would have to disclose details of their cargo and destination. This would help coast guards keep watch on vessels carrying pollutants, fuel oil or any toxic goods and respond in the event of an accident.

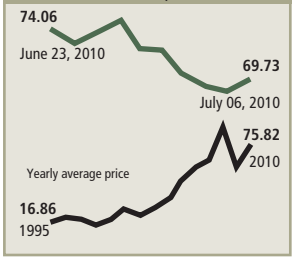
▸ Peru declared a 90-day state of emergency in its Andean region after a gold mine **tailings dam** collapsed, pouring 21 million litres of lead-laced wastewater into surrounding three rivers and farmlands. Peru is a major exporter of gold and copper.

▸ A **wildfire** is threatening the world's largest wetland, Pantanal. Spread over the border of Bolivia, Brazil and Paraguay, the wetland is a popular tourist attraction and has rich biodiversity. The authorities said the blaze is spreading due to a prolonged drought.

▸ The first independent review of criticisms of the global assessment of **climate change** led by the UN said it found "no errors that would undermine the main conclusions" of the panel of international scientists that climate change will have serious consequences.

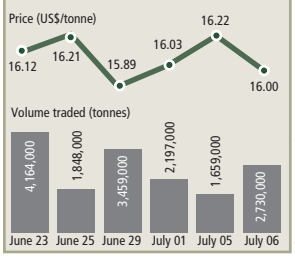
HEATEXCHANGE

International crude oil price (US$/barrel)



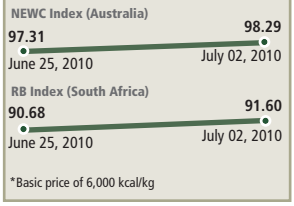
OPEC

International carbon trade



European Climate Exchange

International coal price* (US$/tonne)



*Basic price of 6,000 kcal/kg

Domestic coal price* *(October 15, 2009)*

CENTRAL COAL FIELDS
1,460 (US $31.28)

NORTHERN COAL FIELDS
1,360 (US $29.14)

MAHANADI COAL FIELDS
1,130 (US $24.21)

*In Rs/tonne
Basic price (linkage) of 5,400-6,200 kcal/kg

Firewood: Jammu & Kashmir (Rs/kg)

4.60-5.75

Dung cakes: Jammu & Kashmir (Rs/cake)

0.25



PHOTOGRAPHS: REUTERS

Prime Minister Julia Gillard with cabinet members at a press meet to announce the revised mining tax

MINING TAX

OZ MAGNATES CHOOSE THE PM

Coming under pressure from multinational mining companies, Australia's ruling Labor Party changed the prime minister—without voting.

The mining magnates had vociferously campaigned against a 40 per cent mining tax proposed by the ousted prime minister Kevin Rudd and threatened to halt projects. Some stopped work at the mines. A week after assuming office on June 24, Prime Minister Julia Gillard held a close-door meeting with the magnates and reduced the tax to 30 per cent. The tax, which comes into effect in 2012, would now be applicable to iron ore and coal, rather than all minerals as proposed by Rudd, and would kick in only when profits exceed 12 per cent rather than the 5 per cent in the original plan. Only 320 mining companies will come under the tax net instead of 2,500.

Global investment banking firm, Glodman Sachs, said by revising the tax Canberra stands to lose US $30 billion in revenue this decade.

OIL SPILL

FISHERS SUE EGYPT

Fishers in Egypt sued the government for covering up an oil spill in the Red Sea. Spotted in the last week of June, the spill has since polluted 17 islands and affected fisheries and tourism, said the Cooperative Water Resources Union, a fishers' body. The islands, famous for resorts and diving spots, draw millions of tourists every year; tourism accounts for 11 per cent of Egypt's gross domestic product and is a vital source of jobs and foreign currency. The union claimed the spill was caused by an offshore rig of the Geisum Oil Company, partly owned by the government. The government said the spill was not caused by any of the 188 oil platforms in the area. However, the ministry said it is considering reducing the number of rigs.

OIL SPILL

US SENATE PANEL VOTES TO LIFT LIABILITY CAP

A US Senate panel on July 7 voted to lift all caps on liability that oil companies would face for damages from offshore oil spill. The amendment to the Oil Pollution Act of 1990, if approved by Congress, would expose the oil industry to unlimited compensation for economic losses suffered by local businesses and communities and for damages to the environment. Currently, oil firms enjoy a cap of US $75 million. The amendment would apply retroactively to the spill caused by British Petroleum in the Gulf of Mexico. The ruptured oil well has poured millions of litres of crude into the gulf since April 20.

Another Senate committee has passed a bill to increase civil and criminal penalties on the oil drilling industry for an oil spill and stringent requirements for deep water drilling permits.

GENETICALLY MODIFIED ORGANISMS

GM SALMON SWIMS CLOSE TO DINNER PLATE

The US Food and Drug Administration (FDA) is considering whether to approve the first genetically modified animal that people would eat. The GM salmon can grow double the size and get ready for sale in 18 months instead of three years. The developer of the salmon, AquaBounty Technologies, said FDA has signed five of the seven sets of data required to analyse if the fish is safe to eat and for the environment. Green groups oppose the approval, saying the GM fish is not safe for consumption and would breed with the wild fish and wipe out their species. They have also criticised FDA's approval process. "There is no opportunity for anyone from outside to see the data or criticise it," said Margaret Mellon of Union of Concerned Scientists, a non-profit in USA.

TOURISM

TUSCAN TOWN FOR TOWNSFOLK

Forte dei Marmi, a sea town in Italy's Tuscany district, is in revolt against outsiders. Designed by Michelangelo, the town with a beautiful landscape is a tourist attraction. In recent years millionaires from worldwide, mostly from Russia and Germany, are buying villas in the town, driving the property prices out of control and making it difficult for the town's residents to secure a plot. The town mayor has introduced a law that states only local residents can buy houses in the Forte dei Marmi.

INTERNATIONAL WHALING COMMISSION

WHALES LOST THE TALK

An international effort to limit whaling collapsed on June 23, leaving Japan, Norway and Iceland free to kill the



On the first day of its whaling season Iceland killed three minke whales

mammals. At the annual meeting, the International Whaling Commission pushed for a compromise deal between anti-whaling and whaling nations. It proposed to replace the 24-year-ban on commercial whaling with limited hunting quotas, which would be phased down to zero over 10 years. The three whaling nations offered to limit their catch but refused to phase it out completely. Delegates could not agree on the size as anti-whaling nations insisted on a complete end to whaling. A week later, Iceland announced the beginning of its whaling season with a self-imposed quota of 150 endangered fin whales and 100 minke whales. Japan convicted whaling activist Peter Bethune, who was arrested early this year.

NILE BASIN

EGYPT'S BRIBE

Egypt's foreign minister recently met the heads of five upstream Nile basin countries and said his government would offer them financial support for development. He did not reveal who would receive how much, but hinted Ethiopia, which contributes 85 per cent of the Nile water, would receive the maximum aid. Political analysts say Egypt's move is to abort the Nile treaty the countries signed in May to share the Nile water equally. Egypt fears its supply would be severely reduced if upper stream countries divert the river.

RENEWABLE ENERGY

EU STATES MISS DEADLINE

As the European Commission scrambles to prepare a draft to meet its renewable energy target, bulk of its member states missed the deadline of June 30 to submit their action plans. The EU plans to source 20 per cent of its energy from renewables by 2020. Nine of the 27 members, including the UK, Denmark, the Netherlands and Sweden, have submitted plans of ways to meet their share of the targets, which will be binding. Most countries plan to increase their capacity of wind farms, solar farms and source energy from biomass. The European Renewable Energy Council says the 20 per cent target is technically feasible and would provide a sizeable boost to the European economy in terms of revenue and job creation.

RAINFOREST

BRAZIL MINISTERS PUSH FOR DEFORESTATION

A group of Brazilian lawmakers, known as the ruralists, are pushing a bill to change the country's 1965 forestry code, which could undermine forest protection in the Amazon rainforest. Certain provisions in the forestry code require landowners in the Amazon to retain 80 per cent of their land as legal reserves. The bill argues the provisions threaten agricultural development. The bill also proposes changes to another provision that identifies areas where native forests must be protected, including riverbanks, steep slopes and hilltops. The ruralists want that states should be given the power to reduce such areas by half if necessary.

POACHING

FROZEN TIGERS IN VIETNAM

Environmental police in Vietnam seized two frozen tiger carcasses and the remains of another big cat, believed to be a panther in the central province of Nghe An. Two have been arrested in this connection. In 2009, the country's environmental police seized three frozen tiger carcasses and 11 kg of tiger bones. Only 30 tigers survive in Vietnam's wild.

According to the UN, tiger parts fetch high prices; in China's retail market in 2009, tiger skin fetched up to US $20,000 and bones US $1,200 per kg.



Source: United Nations Office on Drugs and Crime

ACIDTEST



Officials push five-in-one vaccine

Pentavalent vaccine linked to child deaths in Sri Lanka, Bhutan; ball in high court

RAVLEEN KAUR

THE Union health ministry is pushing for the inclusion of the pentavalent vaccine in the universal immunization programme (UIP) for children. In April, the government tried to convince the Delhi High Court to clear the vaccine by submitting a World Health Organization (WHO) report that said there was no problem with the vaccine. The court is hearing an appeal by health activists challenging the ministry's move on the grounds that the vaccine had killed children in Sri Lanka and Bhutan. The next hearing of the case is on July 30.

The pentavalent vaccine is meant to protect children against hepatitis B and haemophilus influenza, type B (Hib) bacteria that causes pneumonia and meningitis. The vaccine also prevents diphtheria, pertussis and tetanus (DPT) that are already covered under UIP.

WHO report misleading

Five children had died in Sri Lanka in 2008 and eight in Bhutan in 2009 after they were administered the pentavalent vaccine. There is no final report on deaths in Bhutan, though it has removed the vaccine from its immunization programme. WHO's expert group inquiry report on Sri Lanka said there was no conclusive evidence to link the vaccines to the deaths.

Activists said the WHO report on deaths in Sri Lanka is misleading. The experts manipulated the standard WHO protocol while preparing the report, said Gopal Dabade, health activist with the Hyderabad non-profit Drugs Action Forum. WHO has six classifications for adverse effects following immunization (AEFI)—certain, probable, possible, unlikely, unrelated and unclassifiable. The expert group removed two categories—possible and probable—and put the deaths in the unlikely category. At the same time the report admitted there was no conclusive evidence regarding an alternate cause for the deaths. Dabade said if the two classifications had not been eliminated, the incidents would have been put in the probable category meaning they are probably linked to the vaccine. "The report, as of now, gives the impression that the vaccine had nothing to do with the deaths which is not true," said Dabade.

The report did not classify the deaths as certain because one of the children was malnourished and two others suffered from Reye's Syndrome (genetic disorder affecting brain and liver). The question WHO should answer is whether the children would have died at that point of time even if they had not been administered the vaccine, said Dabade. WHO did not respond to queries mailed by *Down To Earth*.



AGNIMIRH BASU / CSE

WHO manipulated the standard protocol to conclude deaths were not linked to the vaccine

Rs 350 for one dose

The Indian Council for Medical Research (ICMR) has recommended that the pentavalent vaccine should be introduced in select areas on a pilot basis. "This issue of change of classification never came to our notice," said V M Katoch, director general of ICMR. The latest edition of ICMR's *Journal of Medical Research* has an editorial discussing the deaths.

The health activists who petitioned the court last year said the government would have to spend Rs 350 on one dose of the pentavalent vaccine against the Rs 15 it spends on one dose of DPT which is yet to reach 53 per cent of the rural population. The National Technical Advisory Group of Immunization that advises the ministry on vaccines had also recommended introduction of Hib in UIP. "They (the advisory group) completely ignored the ICMR study in Vellore district which showed incidence of pneumonia due to all possible causes that required hospital attention was a low three in100, and that of meningitis was two in 100," said Jacob Puliyel, paediatrician at St Stephens hospital in Delhi.

The petition also raised the issue of public sector vaccine units in India shutting down (see 'Out of stock', *Down To Earth*, July 15, 2009). The units were reopened but will be forced to close down since they do not have the capacity to manufacture pentavalent vaccine, the activists said. But Katoch said the public sector units can manufacture the vaccine, though that might take time. ■

Jindal power plant risk to alphonsos

It can function without treating SO_2, says environment ministry

RESHMA JATHAR *Mumbai*

THE Union Ministry of Environment and Forests has bent backward to commission the 1,200 MW thermal plant in Ratnagiri district of Maharashtra, promoted by the Jindal group. The ministry has agreed to let the plant function without the flue gas desulfurization (FGD) unit needed to remove sulphur dioxide (SO_2) from the flue gas emitted by burning coal. The company, JSW Energy Limited, has been given three years to install the unit.

JSW had approached the ministry on June 21 seeking permission to operate the plant without the FGD unit costing Rs 527 crore. The ministry agreed and ordered the constitution of a supervisory panel to monitor SO_2 levels. The panel, headed by P Pujari, horticulture professor at Konkan Krishi Vidyapeeth, will identify mango orchards for installing SO_2 monitoring stations. Their data will be uploaded on JSW's website. The plant in Jaigad tehsil is surrounded by alphonso mango orchards.

Farmers and activists have opposed the project from the outset. "At least 900 hectares (ha) near the plant are under mango cultivation. The quality of alphonso mangoes here is very high and they are exported to developed countries that have strict quality certification," said Vivek Bhide, a mango orchard owner in Malgund near Jaigad. "If the plant is commissioned, we will face difficulties in getting export certification," he added.

The Konkan Krishi Vidyapeeth has been studying the possible impact of the project on alphonso mangoes in the area for the Jindals for a year. Pujari said the report cannot be made public till it is completed. Asked about the commissioning of the plant without the FGD unit, Pujari said the ministry's permission is conditional. He said the plant's impact on mango orchards would be known only when monitoring begins. JSW spokesperson Rouhan Sharma refused to comment.

Experts said the emissions will affect the orchards. "Mango flowers are very delicate. They can get charred by air



SATYAJIT CHAVAN

SO_2 emissions can char mango flowers

laden with SO_2. The emissions can also cause acid rain; even acidic dew drops can affect the flowers," said P R Arun, an environmental consultant in Mumbai.

The Delhi High Court had earlier asked the ministry's expert appraisal committee to re-examine the project's environmental clearance. The committee while favouring the plant's commissioning had said the emissions would benefit the mango orchards (see "Coal emissions nourish trees', *Down To Earth*, February 28, 2010).

"It took us almost 10 years to get an FGD unit installed at the 500 MW Dahanu thermal power station in Thane district despite a Supreme Court order," said Michelle Chawla of Tamarind Tree, a non-profit in Dahanu. "Even after the unit was installed, there is no study on its effectiveness," she said. ■

STUDY CONFIRMS ARSENIC DEATHS: Researchers from the US and Bangladesh, monitoring the arsenic intake and mortality rates of 12,000 people over the past decade, have found 20 per cent deaths were caused due to poisoning by the naturally occurring element. Nearly 90 per cent of the country's population depends on groundwater for daily needs. Water wells in Bangladesh have exposed up to 77 million people to toxic levels of arsenic since 1970s.



Coal blocked

Near Tadoba Andhari reserve

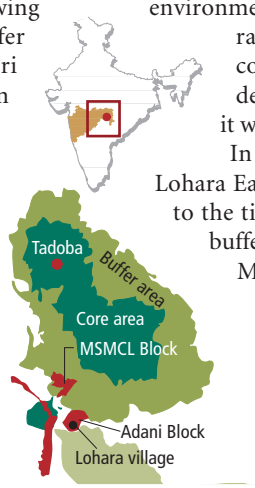
APARNA PALLAVI *Nagpur*

THE Ministry of Coal has decided to de-allocate the captive coal block in Agarzari, Maharashtra, following the notification of the buffer zone around Tadoba Andhari Tiger Reserve (TATR) in Chandrapur district.

The 700 ha coal block was allocated to the Maharashtra State Mining Corporation Limited in July 2007. It reportedly contains 137 million tonnes of coal reserves and is located 3.2 km from the Moharli forest range of the reserve. The mining corporation had proposed to develop this block through the Adani group. Adani Enterprises Limited's own coal mining project in Lohara village was turned down by the Union Ministry of Forests and Environment earlier this year because it fell within the Tadoba Andhari reserve's buffer zone.

After the buffer zone notification on May 5, the state forest department rejected corporation's application for environmental clearance. The corporation then requested the coal ministry for the block's de-allocation. Consequently, it was de-allocated on June 28.

In a related development, the Lohara East captive coal block, close to the tiger reserve, but not in the buffer zone, was de-allocated on May 17. The coal ministry took the decision after one of the block's two allotted companies, M/s Murli Industries Limited, failed to deposit the requisite bank guarantee. ■



Postings under RTI Act ad-hoc

Personnel department has not framed appointment rules

JYOTIKA SOOD

OVER the next six months, 22 information commissioners, including 11 state chief information commissioners (SCICs), would retire. The impending mass vacancy has turned the spotlight on the Department of Personnel and Training (DOPT). It turns out the department has been filling these posts without any policy guideline.

Documents accessed by activist Arvind Kejriwal through Right To Information (RTI) Act show the DOPT is enjoying powers never vested with it. The RTI Act specifies that rules for appointment should be framed by DOPT, but the department never framed any.

"Till date, one or two information commissioners were appointed at a time, so the issue never came to light,"



ILLUSTRATIONS: DIVYA

said Kejriwal. As of now, the RTI Act states only three things about appointments—creation of a selection committee comprising the prime minister, leader of opposition and a cabinet minister; it specifies the eligibility criteria for information commissioners and SCICs and mentions factors that would disqualify a person for the posts. Only eminent persons with knowledge and experience in various fields like law and science should be considered, says the law.

Kejriwal cited various instances of DOPT violating the law. On August 27, 2008, the selection committee cleared four names. Among them, only one name, that of Shailesh Gandhi, was proposed by several RTI activists. The others —Annapurna Dixit, M L Sharma and S N Mishra—were selected from the agenda note prepared by then joint secretary of DOPT, S K Sarkar. They had not applied for the jobs. S N Mishra happened to be then DOPT secretary and Sarkar's boss. On April 6, 2009, the selection panel met to clear one name—Omita Paul, adviser to Union Minister Pranab Mukherjee. She was appointed information commissioner in the Central Information Commission just before the parliamentary elections. She resigned in June when the Congress-led UPA returned to power. Hitender Jain of the non-profit, Resurgence India, said he had found similar instances of adhocism in Punjab. ■

GMR jumps the gun

Begins constructing power plant in Chhattisgarh, illegally

SUGANDH JUNEJA *Raikheda, Raipur*

GMR Energy, the flagship power venture of the GMR group has started constructing a coal-fired power plant in Raikheda village near Raipur without obtaining environmental clearance.

The public hearing for the proposed 1,200 MW thermal plant was held in January last year. The clearance is still under process. When an officer of the Chhattisgarh Environment Conservation Board (CECB) visited the plant on June 15, he witnessed digging in progress at the 526-hectare (ha) site and issued a notice to the company. The action was taken on the complaint of Vidhan Mishra, former state industry minister. In its response to the notice, GMR confirmed construction work was on. It said it was also diverting a road and canal passing through the site.

Regional officer of CECB, A Behre assured, "Whatever little work had commenced has been stopped." When the *Down To Earth* correspondent visited the site, work was on. Heavy machinery like cement mixers and cranes could be seen within the fenced area. Land-levelling work was almost complete. Workers at the site said the company has sunk six tubewells to extract groundwater. All these works are illegal as the Environmental Impact Assessment (EIA) Notification of 2006 states no construction activity, including levelling of land, can commence without obtaining an environmental clearance (see 'Jindal pays for flouting law', p9).

Mishra said the power plant will not only affect Raikheda, but also other villages nearby—Gaitara, Chicholi, Bhatapara and Murra. Mishra's main concern is water. "There is hardly any water to drink in the summers. How will people survive if the company guzzles all available water?" he asked.

GMR has pegged its water requirement at 36 million cubic metres in the EIA report. Water will be drawn from the Mahanadi, 35 km away. Sinking of tubewells indicate otherwise.

GMR Energy's spokesperson, Anil Kumar Jain said only a boundary and some security offices have been built. "The tubewells are for the security offices. No other construction is happening at the site," he said.



SUGANDH JUNEJA / CSE

Work on despite environment conservation board's order

Residents are disgruntled. "Our lands have been purchased at differential rates causing conflicts among residents," said Khilawan Sharma, former sarpanch of Raikheda. Tribals allegedly received less payment.

"We have been duped. We were promised jobs but nothing has happened," said Sharma. ■

Nuclear plant triggers panic

People stall soil testing

RAJIL MENON *Jasapara, Bhavnagar*



PSS / MICHAEL MAZGAONKAR

Officials who tried to collect soil samples from the site were* gheraoed *for hours

THE preliminary work on the nuclear power plant in Gujarat's Bhavnagar district has started amid protests. Government officials who visited the site in Jasapara village on June 11 to collect soil samples were *gheraoed* for over six hours by angry people. The soil samples were to be collected for laboratory tests in preparation for construction work. But the people of the area do not want the plant, fearing groundwater contamination and mishaps.

The Nuclear Power Corporation of India Ltd (NPCIL) is setting up the 6,000 MW plant costing Rs 50,000 crore. It will be designed using American technology. The government has earmarked 1,000 hectares (ha) for the project in Jasapara where residents of three other villages also own land.

"As soon as the officials arrived, people from affected villages reached the site and told them to leave. Fearing villagers' ire, the officials left after waiting till noon," said Shakti Singh Gohil, vice-president of Jasapara gram panchayat. He said all affected villages—Mandva, Khadarpur, Mithi Virdi and Jasapara—have sent protest letters to the collector and the prime minister.

"We have the best quality groundwater. We do not want a nuclear power plant because we fear it will contaminate both land and water," said Vibhabhai Batda, a 55-year-old resident of Jasapara. The area is fertile. Mithi Virdi, in particular, is famous for its *kesar* mangoes. About 150 mango trees grow in one hectare and fetch three lakh rupees a year, said Gohil. The villagers grow pulses, vegetables and mangoes. "We may be living in villages, but we know what happened at Chernobyl. What if there is a nuclear leak?" asked Arvind Singh a shop owner in Jasapara.

NPCIL said the site was chosen by an expert panel after a rigorous survey of two to three years, as per the guidelines of the Atomic Energy Regulatory Board. A P Shah, chief engineer of NPCIL and in-charge of the Jasapara plant, said the site was chosen as it is close to the sea and seawater can be used for cooling. What's more, heavy equipment can be brought to the site via sea-route. He said the villagers' fears were unfounded; only 150 hectares would be used for construction, the rest of the land will be an exclusion zone with no population.

He said NPCIL would go by the rehabilitation package decided by the state. "We are hopeful that construction would begin by 2012," said Shah.

But the project has run into trouble with the Union Ministry of Environment and Forests. The ministry's expert appraisal committee has rejected NPCIL's pre-feasibility reports submitted for obtaining the terms of reference (TOR). The TOR is required for conducting the mandatory environmental impact assessment. The panel has pointed out deficiencies in the reports and has asked the company to submit fresh proposals. ■

88,000 fake ration cards

Orissa government to save Rs 40 crore by cancelling them

ASHUTOSH MISHRA *Bhubaneswar*

THE Orissa government has cancelled over 88,000 bogus ration cards detected during a two-and-a-half-month drive by the state's food supplies department. Sources said more than 68,000 of the ghost cards detected in 27 of Orissa's 30 districts between November 2009 and January this year belonged to the Below Poverty Line (BPL) category; 9,877 such cards were under the Antyodyaya scheme aimed to benefit the extremely poor. Card holders of these two categories get the largest rations from the public distribution system (PDS) at discounted rates.

The minister of state for food supplies and consumer welfare, Sarada Prasad Nayak, said reports from three districts—Bhadrak, Boudh and Kalahandi—were not in yet. "The number could very well touch one lakh. Cancellation of these cards would mean a net annual saving of around Rs 40 crore as the state has been providing rice at Rs 2 per kg to card holders against the market price of over Rs 6 per kg," he added. The government has decided to reduce the districts' monthly quota of PDS ration.



The minister said the drive had become necessary because the BPL cards were issued in 1997. "We all know how it happens. Sometimes the card holders die but the ration card continues," Nayak explained. During the drive the identity of card holders was verified; they were asked to bring proof of identity like voting cards and bank pass books along with their ration cards. In disputed cases, the card holder could address an appeal to the block development officer who forwarded it to the district collector. ■

Pune metro rail on track

Public hearing was a farce, say activists

NIDHI JAMWAL *Pune*

PUNE'S civic authorities are moving ahead with the metro rail project. City mayor Mohansingh Rajpal has announced December 12 as the date for laying the project's foundation stone even as city planners questioned the need for the expensive transport system. A public hearing organised on June 18 to get people's views on the project was wound up in a hurry after a scuffle broke out between activists opposing the project and the organisers.

"The public hearing was a farce. In spite of repeated requests, we were not allowed to speak. We had to snatch the microphone to voice our concerns," said Neeraj Jain of Pune non-profit Lokayat. After the meeting, the activists tried to submit written objections. Officials refused to accept them, saying it was an informal meeting. The hearing was called by the mayor and chairperson of the Pune Municipal Corporation's (PMC) Standing Committee. On June 23, the non-profits organised a protest demanding the project's scrapping. But the general house of PMC approved the elevated corridor between Vanaz and Ramwadi on June 25.

The standing committee of PMC had accepted the detailed project report prepared by the Delhi Metro Rail Corporation (DMRC) earlier in January. The metro project envisages a network of 75.5 km at a conservative Rs 17,935 crore. Activists claim the cost will go up to Rs 30,000 crore. To begin with, the PMC is going ahead with one of the two routes in phase1.

"The DMRC's project report clearly states that its objective is to identify the best metro rail corridors in the city. It does not even claim to justify the need for a metro system," pointed out Parisar, a non-profit working on integrated transport system for the city. It said a project as expensive as this cannot be undertaken without a comprehensive study clearly identifying the need for it.

If metro project is implemented without integrating it with other modes of transport, people will not leave their personal vehicles, said Jain. Delhi is facing this problem. Its metro ridership is way below the projected figures (see 'Carriage of convenience', *Down To Earth*, April 2010). International consultancy firm Wilbur Smith and Associates had prepared a comprehensive mobility plan for Pune last year but it is independent of the DMRC report. This mobility plan is yet to be adopted by the general house of PMC.

The Pune Technical Coalition, representing 13 institutions of architects and urban planners, said there are not enough commuters to justify building a metro. Metro can ferry 30,000 to 50,000 people in one hour, whereas the projected figures for the Vanaz-Ramawadi route is 11,000 commuters in 2031.

VKJ Rane, former chief of public sector enterprise IRCON International Ltd, questioned the choice of standard gauge tracks over broad gauge for the project. The capacity of a broad gauge coach is 74 per cent higher; it can be built here 40 per cent cheaper, he said. ■



COURTESY: LOKAYAT

Municipality officials refused to accept written submissions at the public hearing

Ministry revokes coastal clearance

Kartanaka power project gave false information

NIDHI JAMWAL *Mumbai*

IT IS the end of the road for the 450 MW thermal power plant near Karwar in Karnataka. On June 15, the Union Ministry of Environment and Forests cancelled the coastal regulation zone (CRZ) clearance it granted for the construction of a coal unloading wharf for the power plant in village Hanakona, near Karwar in Uttar Kannada district. Earlier, in April, the ministry had cancelled the environment clearance for the coal-fired plant.

People in the area have been opposing the Ind-Bharath Thermal Power Ltd (IBTPL) project for the past few years. "Our agitation has borne fruit," said B S Pai, advocate in Karwar.

In its letter to the company, the ministry said IBTPL had "concealed factual information/details in its submissions". For instance, IBTPL lied about the distance between the proposed plant and Cotigao Wildlife Sanctuary in Goa: the company claimed the sanctuary was 17 km away, a Central team of experts found it to be within 5 km. The ministry's letter said the company also lied about where the cooling water would be discharged and about the presence of a dense forest and mangroves around the proposed plant.

The ministry had cleared the coal wharf and the plant in 2008. But people protested and brought several violations to the ministry's notice. The ministry then decided to review the clearances through a joint expert appraisal panel. The panel confirmed the violations. IBTPL is shifting the project to Tuticorin, Tamil Nadu. ■

Reduce Subansiri dam height: panel

Will National Hydro Power Corporation heed report?

BHARAT LAL SETH

AN EIGHT-MEMBER expert committee has recommended a thorough review and redesign of the 115-metre high dam on the Subansiri river, a tributary of the Brahmaputra. The National Hydro Power Corporation (NHPC) is developing the 2,000 MW Lower Subansiri Hydro Power project in Dhemaji district of Assam.

In its final report submitted on June 29 to NHPC, the committee expressed reservations over the dam, saying it could adversely impact downstream areas. The report revealed inadequacies in the dam's design. The spillway for releasing floodwaters has been designed incorrectly, it said. The spillway is designed for a maximum discharge of 12,024 cumec, whereas the maximum discharge recorded on July 11, 1971, was more than 21,230 cumec.

"Clearly the dam has not been designed for the highest discharge," said Chandan Mahanta of IIT Guwahati, a panel member. This can spell disaster for downstream areas, he added.

The panel recommended reducing dam height and power generation capacity to minimize its adverse economic and environmental impacts.

If the present design parameters are followed, the dam will impact biodiversity and lead to siltation. To deal with this, the report recommended a minimum flow of 320 cumec and a minimum depth of three metres in the dolphin habitat stretches of the river. To minimise dam-induced flash floods, the report has recommended flood cushioning in the reservoir.

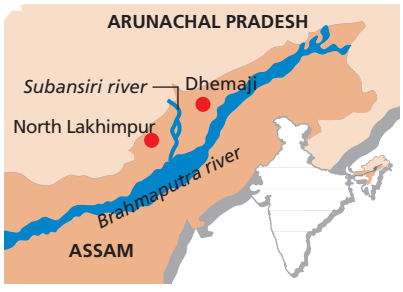
The Assam government had set up the expert committee in December 2006. It comprised members from IIT Guwahati, Dibrugarh University and Gauhati University, and was asked to study the downstream impact of the dam project. The project is 40 per cent complete.

The report sparked protests. Environmentalist groups and the All Assam Students Union demanded immediate stoppage of work. They believe even after redesigning, the dam will create environmental and socio-economic problems. They are planning protests in Dispur.

Officials at the NHPC headquarters in Faridabad, near Delhi, said they were yet to receive the report. "When it arrives we will look into all the concerns and the remedial measures suggested by the committee," said a senior official.

Earlier this year, Union Power Minister Sushil Kumar Shinde had assured activists that the Subansiri dam project would be reviewed on the basis of the final report.

"My feeling is that either the committee will compromise the report or it will simply be discarded since more than Rs 500 crore has already been spent," said Ravindra Nath, founder member of River Basin Friends, a campaign front in Assam. ■



Panel's recommendations

- Catchment area needs to be afforested while maintaining slope to minimise soil erosion
- Minimise dam induced flash floods through proper cushioning in the reservoir
- Re-examination and redesigning of spillway
- Attention to riparian rights and indigenous people's rights
- Minimum discharge of 320 cumec to be maintained
- Embankments of the river to be raised and strengthened
- A minimum 3-metre depth in the dolphin habitat areas

UPDATE

Public taken for a ride

People in eight villages in Muzaffarpur district of Bihar have been protesting the construction of an asbestos fibre-cement roofing plant nearby since January when work began at the site without the mandatory environmental clearance. But they did not get a chance to voice their concerns at the public hearing held for the project on June 28.

"We were told to ask only one question. Company officials said they would answer our queries later during personal discussions which never happened," said Rajesh Kumar, an activist. It was only after the meeting concluded the villagers realised they had been tricked; they had never attended such a meeting before.

Those who attended the meeting said it was managed by the officials of Balmukund Cement and Roofing Materials Ltd, the company constructing the factory in Chainpur village. The company officials allowed only people working at the factory site to speak, said the residents of Chainpur. The proceeding was concluded without reading out the minutes of the meeting. The Environmental Impact Assessment (EIA) notification of 2006 specifies the proceedings have to be read out in the language understood by the people, after which the agreed minutes are signed by the district magistrate. The Bihar State Pollution Control Board that organised the event refused to comment on the proceedings. Its member secretary M K Singh said the recording of the event, along with the minutes, would be sent to the Union environment ministry for a decision. Earlier, protests had led to the district magistrate changing the date and venue of the public hearing (see 'Asbestos unit disturbs Chainpur's peace', *Down To Earth*, June 30, 2010).

—NIVIT KUMAR YADAV

US bank uses carbon smokescreen

EXIM Bank nearly denied funds to Reliance's coal-fired plant

KUSHAL PAL SINGH YADAV

RELIANCE Power's 4,000 megawatt ultra mega power project in Sidhi district in Madhya Pradesh came close to becoming the first coal-fired power plant in India to be denied financing by a developed country on the pretext of reducing carbon emissions. On June 24, the board of Export-Import Bank of the United States (EXIM) voted "not to proceed with the application from Reliance Power Limited to consider financing of the Sasan (name of village) project in Madhya Pradesh". The Indian project was rejected ostensibly to "mitigate the effect of carbon emissions on our climate".

The US, historically the biggest emitter of carbon dioxide (CO_2), has refused to take action to reduce its carbon emissions. The bank reversed its decision following a sustained campaign in the US to protect US jobs. EXIM also extracted a promise from Reliance to invest in green energy.

The financing is in the form of a US $600-million loan guarantee to Reliance Power for buying coal mining equipment from Bucyrus International, a US manufacturer based in Wisconsin. After the bank's board rejected the proposal, Reliance Power immediately made it clear that the development will have no impact on its project.

"The US $4.5 billion Sasan power project has achieved financial closure and this development will have no adverse impact on the project progress and timelines," said a Reliance spokesperson. The funding proposal from EXIM was solely to support exports of US-manufactured coal mining equipments and to give the project refinancing flexibility, he added.

Industry sources said it was the threat of Reliance moving to other markets to buy equipment which created insecurity in the US. This would have been a big setback to the US power and mining equipment industry and thousands of its workers.

EXIM's initial decision to reject the Reliance application had political repercussions. Republicans, already complaining that President Barack Obama's cap-and-trade energy bill was leading to huge loss of jobs, protested the decision. They said the rejection of Bucyrus deal would lead to hundreds of people in Wisconsin losing jobs. Several republican senators and Congressmen wrote to the bank and Obama, forcing the bank to reconsider the project.

Fred P Hochberg, president and chairman of EXIM Bank, spoke to Anil Ambani, chairperson of Reliance Power, on June 28. Two days later, he wrote to Ambani informing him about the approval. "…Sasan project should be resubmitted for the board's consideration, including new information. The request will also take into account Reliance Power's expressed commitment to invest in the renewable energy sector," the letter read.

According to the deal, the bank will sign a memorandum of understanding (MOU) with Reliance. "This MOU would relate to the construction of renewable energy power plants, producing at least 250 MW power, which are expected to produce no carbon emissions," the letter said. "It is our mutual desire that the project be sourced from United States companies on commercially competitive terms," the letter added.



US with 600 coal-fired power plants and 60 more on the anvil is bullying developing countries

Bullying tactics

Denying energy-starved developing countries access to finance to build coal-fired power plants has become a practice in the past couple of years. And it is not just the national financial institutions of the developed countries. The US and European governments have been arm twisting the World Bank to reject such power projects, irrespective of the fact that developing countries need to provide millions of people access to energy.

Coal is still the cheapest and most affordable option for them.

At the beginning of this year, the World Bank refused to fund the Thar coal project in Pakistan. Reports noted the double standards followed by developed countries like the US, which gets more than half its electricity from over 600 coal-fired power plants; 60 new plants are planned. Several new coal projects are planned in Europe as well. The civil-society groups in the West also support their governments in denying funds to developing countries for coal-fired power plants.

In March this year, these groups led a campaign against the World Bank funding the Eskom power project in South Africa. But the bank approved the US $3.7 billion loan despite US and several other European governments abstaining from voting.

The activists argue the World Bank should invest in renewable energy projects, but they refuse to elaborate on ways to meet the increased cost of these projects. ■



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Rags to pads

Self-help groups making low-cost sanitary napkins are ready to supply them to rural India

KUMAR SAMBHAV SHRIVASTAVA

The Union health ministry launched a Rs 150-crore scheme last month to promote menstrual health among rural adolescent girls. Unavailability and high costs of sanitary napkins deter menstrual hygiene in rural India. The scheme aims to provide one pack of six sanitary napkins at Re 1 to girls in the below-poverty-line category. Those above the poverty line will get the pack for Rs 5. Approved by the National Rural Health Mission, the scheme's first phase will cover 150 districts, targeting 15 million girls between 10 and 19 years of age.

"Women in most villages use dirty cloths during their menstrual cycle. Sometimes the same cloth is shared by more than one woman," said Sudha Tewari of Parivar Seva Sanstha, a non-profit in Delhi that has studied menstrual hygiene in villages. "In Rajasthan, some women use sand bags. Such unhygienic methods cause diseases, including reproductive tract infection," she added.

Citing such health problems activists for long have been demanding a programme targeting menstrual health in villages. "The ministry was working on the scheme for the past two years," said a health ministry official. There were suggestions that the napkins should be sourced from self-help groups because they make low-cost sanitary napkins, especially in south India, he added. The team under the National Rural Health Mission travelled to Tamil Nadu where self-help groups make sanitary napkins. After the visit the ministry decided that of the 150 districts it would procure sanitary napkins for 50 districts from the groups.

Cost is the key

Self-help groups in southern India have been a success. Tamil Nadu alone has around 100 sanitary napkin manufacturing units. Each unit makes 30,000-50,000 napkins per month and sells them to women at Rs 1-2 per napkin. A group started 10 years ago by Kannaghi Chandrashekhar of Puddkottai village has helped 150,000 women shift from old cloth to sanitary napkins in and around the village.

Her group, called Welfare Organisation for Multi-purpose Mass Awareness Network (WOMAN) makes 600,000 sanitary napkins every month and sells them at Rs 2 per napkin. "We started with a small unit and made napkins using cloth and cotton. Our technology has evolved and now we have six big units that make industry-standard napkins at minimal cost," said Kannaghi. The napkins are made of pine wood pulp, cotton and cloth. The cost of production of each napkin is Rs 1.20. The production unit sells the napkins to vendors for Rs 1.50, the profit goes towards running the units.

Every production unit employs 10-12 women. It has helped improve their quality of life. N Noorjahan, 38, is in charge of one such manufacturing unit



An employee of WOMAN uses pine wood pulp to make napkins



PHOTOGRAPHS: VIBHA VARSHNEY / CSE

of WOMAN. In 2005, when she decided to work with the group, her husband, a bus conductor, earned Rs 2,000 and it was difficult to make ends meet. Today, she earns Rs 5,000 and they lead a better life. WOMAN also employs to spread the word on the use and disposal of napkins. "They can be burned easily without causing pollution," said Sushila, 49, of WOMAN.

Self-help groups are gradually gaining popularity in Karnataka, Andhra Pradesh, Maharashtra, Gujarat and Uttar Pradesh. In Anupshaher in Uttar Pradesh, a girls' school run by the non-profit Pardada Pardadi Educational Society has installed a low-cost sanitary napkin unit. It employs its former students to run the unit, and sells a pack of 10 napkins to students at Rs 5. Members of the students' families have also started to order.

WOMAN, a self-help group in Tamil Nadu, makes 600,000 napkins every month and sells them at Rs 2 each

Now with the government scheme, these groups hope to expand their reach. But the government might also rope in private players. "Napkins can be procured from self-help groups for 50 districts. For the remaining 100 districts, bidding might be done because self-help groups' scope is limited," said a health ministry official. "The choice of sourcing napkins would be left to the states," he added.

Bidding might promote corruption, said Abhay Bang, who runs a community-health non-profit SEARCH in Gadchiroli, Maharashtra. Besides, it will open the routes for multinational companies to enter the rural market. "Once rural women are dependent on their products, the MNCs can increase the prices according to their wish. The napkins should be procured from self-help groups," he added.

Procter and Gamble (P&G), an MNC that makes sanitary napkins, refused to comment whether it would participate in the bidding. Despite repeated attempts, P&G and Johnson and Johnson did not give their cost break-up.

Kannaghi, though, is prepared to participate in bidding. "Barring southern India, self-help groups may not have taken to making sanitary napkins on a large scale. We shall exchange the technology and products and enable them to take up the task," she added.

M Santhanam, who runs a sanitary napkin unit in Karnataka, said buying napkins from self-help groups would be the best deal for the government simply because of the price they quote. ■

"My room used to be full of used napkins"

A Muruganatham, 47, of Coimbatore, invented a machine that makes 1,000 sanitary napkins daily. He also improvised a vending machine that can dispense napkins when coins are inserted. He spoke to* Down To Earth *on what must be done to make menstrual hygiene affordable

On the idea of a machine
My wife would use an old cloth during her periods. She told me if all the women in the family started buying napkins, they would have to cut down on milk. This was a revelation. I had to do something.

On the difficult years
I started with cotton. The most difficult was to find subjects for testing the napkins I made. I failed to convince my wife and sister. College girls thought I was psycho when I approached them with my products. I even tried a football bladder and put goat's blood on it, with my napkin under it. I convinced medical students to use my napkins and would collect their used napkins for study. But I did not get results. When I got to know that wood fibre is used in napkins things became simpler.

On family support
When my mother saw my store full of used napkins, she packed and moved in with my sister.

On the innovation
The raw materials include pine wood pulp that absorbs the fluid, non-woven fibre sheet for wrapping it, polyethylene film to make the base and the release paper to stick the napkin on the garments. The wood pulp is first converted into fine fibres in the de-fibration unit of the machine. These fibres are then pressed and cut into rectangular blocks of desired size. This is done using a core-forming unit, operated by a foot pedal. These blocks are wrapped on three sides with a non-woven cotton sheet. The sealing unit is also powered by a foot pedal. The fourth stage involves disinfecting the napkins using ultraviolet rays in the sterilisation unit.



On market
I turned down an offer from a private company to sell the patent of my machine. I want to use it to promote hygiene among rural and urban poor. I sell my machines to self-help groups.

MNCs *v* self-help groups
Cost is a big difference. MNCs sell each napkin for Rs 3-11; self-help groups sell it for Rs 1-2. Decentralised and micro-level production model makes their napkins cheap. We import the raw material—wood pulp from the US, non-woven fibre from Canada—in bulk and supply it to units in India. Manufacturing involves minimum energy consumption as the machines are semi automatic. The transporting cost is very little as the products are sold locally.

Two, our napkins are biodegradable. Companies use synthetic fibre sheet to cover the wood pulp. This enhances their quality along with the cost but the napkins become non-degradable.

Three, the self-help group model is self-sustainable. The groups provide employment and spread awareness.

Guggal faces sticky end

Ayurveda prescribes it for heart ailments; no data available on surviving plants

ANKUR PALIWAL

India is these days relying on imports to meet the demand for a plant extract valued for its medicinal properties. Guggal or *Commiphora wightii* grows in the wild in the arid and semi-arid regions of Pakistan and northern India; its resin, guggal-gum, is prescribed in Ayurveda for heart ailments, obesity and arthritis. Pharma companies also use it in drugs for reducing cholestrol. But the gum's availability in India has plummeted because guggal shrubs are disappearing from its main habitats in Gujarat and Rajasthan. Very little data is available on the shrubs left; the International Union for Nature Conservation (IUCN) has put it in the data-deficient category.

"The demand for guggal-gum has more than doubled in the past 10 years. We are completely dependent on imports from Pakistan—about 400 tonnes a year," said Rakesh Agarwal, a dealer of medicinal plants at Khari Baoli wholesale market in old Delhi. He said supply from Rajasthan and Gujarat is very little. As a result, the gum's price has risen from Rs 25 to Rs 300-Rs 500 per kg in the past decade. The demand is driven by drug companies. Research shows that guggalsterones (the active compound in guggal) inhibit cholestrol synthesis, said N Srikant, assistant director with the Central Council for Research in Ayurveda and Siddha under the Union health ministry (see box).

Bled for resin

Unregulated exploitation of guggal for its resin is the main reason for its disappearance, said Vineet Soni, associate professor at the Jaipur National University. Soni, a member of the IUCN, said tribals and people in villages use crude methods to extract gum; the government has not standardized tapping methods. "They make deep cuts on the stem and then apply a paste of horse urine mixed with cobalt sulphate (a toxin) around the incisions. This increases gum yield four times, but the shrub dies within a month or two," said Soni. The resin ducts are present in the cortex region of the plant and a half-inch cut is enough to tap the gum. Deep cuts damage the vascular bundles transporting water and nutrients and inhibit metabolism, he explained.

The destroyed shrubs are not easy to replace. Guggal seeds do not germinate easily and the saplings take a long time to mature—about 10 years. "We do not cultivate guggal because it would occupy our fields for a long time," said Nanchi, a resident of Ballabhpura village near Jaipur.

Galta hill range on the outskirts of Jaipur is one of the areas identified for guggal conservation. "The hills were full of guggal trees 30 years ago. We used to climb the hills with the help of its branches. Only a few are left now," said Kesar Lal, a 52-year-old shopkeeper in Jaggah Ki Bawri village near Galta. Tapping and felling for fuel destroyed the shrubs, he said, adding forest officials hardly survey the hills. The in-charge of Galta post, G S Rathod, refuted villagers' claims. The hills are divided into beats and surveillance is round-the-clock, he claimed.



The gum tappers make deep cuts on the stem and apply a toxic paste of cobalt sulphate around it to increase yield

—VINEET SONI
Associate professor at the Jaipur National University

The government has initiated a programme to conserve medicinal plants, including guggal under the National Mission on Medicinal Plants in 2008-2009. The mission encourages cultivation of medicinal plants to reduce the pressure on forests and has listed guggal



PHOTOGRAPHS: ANKUR PALIWAL / CSE

Stem cuttings survive better

in the endangered category. "Rajasthan and Maharashtra proposed 125 hectares (ha) and 25 ha respectively under the mission for guggal cultivation. We are awaiting reports on the success from the sites," said R B Singh, consultant with the National Medicinal Plant Board. The board has sanctioned Rs 11.25 crore for three projects and offers 75 per cent subsidy on guggal cultivation.

Doubts cloud conservation

The Rajasthan government has undertaken a Rs 6.50 crore project on its own for conserving the plant and expects to bring 1,700 ha under guggal cultivation by next April. "We are raising 486,000 saplings. These will be distributed to nurseries in 32 districts," said Shikha Mehra, conservator of medicinal plants in Rajasthan. The state has also set up hi-tech nurseries under the project where the stem cuttings are nurtured in controlled temperature of about 35°C. The saplings are then kept in normal temperatures and acclimatized before they are planted in the wild.

Officials in the forest department said the project may not work because sophisticated technology and monitoring are required to ensure survival of the saplings in the wild. "The success rate of guggal transferred from the nurseries to the wild is 30-40 per cent," said Ramkaran Chaudhary, forestry in-charge of the hi-tech nursery at Jagatpura locality in Jaipur.

Soni said the conservation efforts have started rather late as the plant population has been declining for sometime. Only a concerted effort by the government in collaboration with scientists and the community can now save the plant, he said. Soni is spearheading a Save Guggal Movement in Rajasthan to spread awareness about the shrub.

Soni's research, published in the *South African Journal of Botany*, has shown higher concentration of guggalsterone in the shrubs in central, northern and western Rajasthan. These can be used for mass propagation and genetic improvement. ■

Guggal lowers cholestrol

Guggal-gum extract targets the Farnesoid X Receptor (FXR) that regulates cholestrol and checks bile acids produced from cholestrol by the liver, according to a study by Southwestern Medical Center in Dallas and the Baylor College of Medicine in Houston. The ethyl acetate extract of the resin was found to lower low-density lipoprotein cholestrol and triglycerides in humans.

A study by Texas Southern University in Houston has suggested guggalsterone can suppress tumours, their growth and spread.



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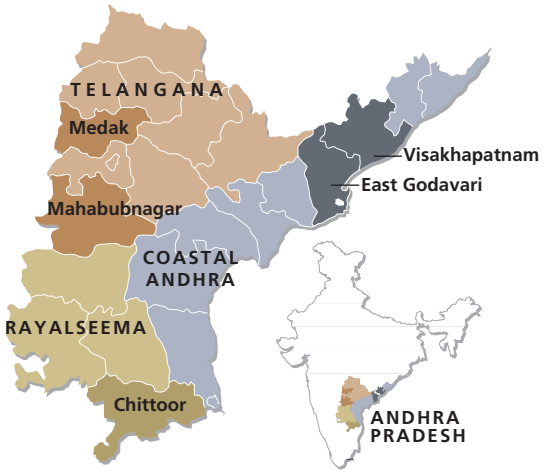
GROUND REALITY

Groundwater has failed Andhra Pradesh's farmers. Between 1997 and 2006, about 4,500 farmers committed suicide, unable to repay loans they had taken to drill borewells. MOYNA and ASHUTOSH MISHRA found farmers scoffing at rules to dig deeper for an uncertain resource. They have few alternatives. The Andhra government intends to check the increasingly depleting groundwater reserves by roping in farmers to monitor groundwater use. Will it result in a shift to less water-intensive crops?



PHOTOGRAPHS: MOYNA / CSE





MAHABUBNAGAR

A Shekhar, 25, committed suicide a year ago. A resident of Burgupalle village in Andhra Pradesh's Mahabubnagar district, he had bought half a hectare (ha) for growing paddy. He borrowed Rs 1.5 lakh to sink three borewells but did not find groundwater. Shekhar could not repay the debt, so he hung himself in his house. His wife, along with their two and four years old sons, left the village to find work in Hyderabad, said Bal Swami, once Shekhar's neighbour.

Swami has a debt of Rs 5 lakh. He sunk 15 borewells between March and April this year. The deepest was 106 metres. Over the past six years he has sunk 39 borewells. Two yield water. He uses them to grow paddy on about a hectare to make ends meet. His remaining four ha lie unused.

In Velgonda village, 25 km from Burgupalli, farmer Venkat Reddy, 50, sank seven borewells—the deepest at 122 metres—in one day in April. Two yielded water. Rig owners refused to drill further because the rig was not powerful enough to drill through the rock bed. He is now contemplating a loan from a bank to repay the interest for the Rs 4 lakh he borrowed from lenders in his village. R Krishtaya Naik, sarpanch of Macharam village in the district, had to sell 1.2 ha to repay the debt incurred four years ago after sinking three borewells.

Explaining the desperate attempts of farmers to find water, Swami said if one hits water, one earns. And then the loans can be repaid in two to five crop seasons. Otherwise, it's a difficult life forcing farmers to take extreme steps such as suicide.

Finding groundwater is a gamble. Between 2009 and 2010 the groundwater department of Andhra Pradesh investigated 15,263 sites and recommended 7,335 sites for borewells. "There is no foolproof way of finding water," said Sudershan Reddy of Vepur village where 80 borewells were drilled this year; four yield water. Geologists sometimes help farmers find the spot where groundwater would be found. They charge Rs 1,000-5,000. Sometimes people blessed with special powers, or water diviners as they are called, bail out farmers by locating the right spot. They use coconuts, *neem* twigs to locate groundwater, and usually charge Rs 500 or more (see: *Local solutions*).

"Even with machines and gadgets we are not 100 per cent sure of hitting water. We cannot disregard native knowledge," said N Eswara Reddy, capacity building expert with the groundwater department.

"Use of coconuts for precision could be debated, but not dismissed," he added.

CHITTOOR

Dhanalakshmi's eyes turn moist every time she looks at the portrait of her husband in her house in Ayyavandlapalle village in Pulicherla mandal. Her husband Siddaiah Naidu consumed pesticide in 2004 after the five borewells he sunk on his 1.2 ha failed.

His neighbour, K Muniratnam Naidu, has sunk seven borewells in the past nine years. He is planning one more this year. "I cannot let my land be at the mercy of nature. If it does not rain the groundnut crop will be ruined, and we might starve," he said.

In the nearby K V Palle mandal, Raja Reddy who owns about five ha, has tried to kill himself thrice. Seven borewells failed Raja; he has a debt of Rs 2 lakh with an interest rate of 3 per cent per month. He returns late to avoid creditors who pester his wife Lakshamma.

Raja's daughters live with relatives 20 km away because of the everyday embarrassment with creditors. "He asks me to leave the village with him because he cannot stand the humiliation of turning a pauper. But where do we go and what do we do?" his wife asked.

Raja drilled his last borewell to 198 metres. He wanted the water for his tomato crop, which fetches good returns. Fellow villager A Venkataramana Reddy said there were a few small tanks in the village for irrigation, which remain dry in summer.

"We need water and cannot grow anything without borewells, so we keep trying despite failures," he said. Venkataramana, who grows groundnut, has two failed borewells, a debt of Rs 1 lakh with an interest of 3 per cent per month.



SAROJ MISHRA

Dhanalakshmi's husband killed himself after five borewells failed him



K Muniratnam will try drilling the eighth borewell. Or, he will starve

Drilling to new depths

Chittoor is prone to drought, which makes it worse. As per official records about 56 per cent of the total irrigated area in the district is watered through borewells. Therefore, drilling to new depths is not unusual. The average depth of groundwater in the western mandals of the district is about 152 metres, said Vijay Shekhar of the non-profit, Foundation for Ecological Security. T Basavaiah, deputy tehsildar of K V Palle mandal, though, claimed groundwater in the mandal is at 106 metres. A farmer claimed it is deeper.

"We drilled to 170 metres on the advice of a geologist. We did not find water. The geologist asked us to drill to 213 metres, but the rig was not powerful enough. We gave up," said Muniratnam Naidu of Ayyavandlapalle.

The density and depth of borewells are a result of the shift to commercial crops, lack of alternative irrigation sources and deficit rainfall, said B Venkat Reddy of the non-profit, Sahajeevan. "Chittoor has seen a shift to tomato farming. It requires intensive irrigation between February and July, the driest period," he said. "Tomatoes fetch good money, with farmers receiving as much as Rs 35 per kg at times."

Local solutions: coconuts, twigs

G Redappa is a self-proclaimed geologist who has located 4,000 borewell points for his farmer clients in Chittoor district. His paraphernalia include raw coconuts and V-shaped *neem* twigs, and sometimes stones and iron rods. "My success rate is 100 per cent," said Redappa who used to be a peon in the state groundwater department.


SAROJ MISHRA

Clad usually in a white *lungi* and full-sleeved shirt, he skillfully manages a green coconut on his right palm. If it quivers and starts rolling down his palm, groundwater has to be underneath, he said. His explanation is if there is groundwater beneath he experiences electrical vibrations that pass through his feet and shake the coconut. The uninitiated might not feel the vibrations. An expert always knows, he added. He also uses his instinctive ability to determine whether water is underground. Farmers pay him Rs 2,000 for finding one spot. It is also not rare for him to have "revealing visions such as seeing gallons of water passing over his head at the right spot".

Besides K V Palle mandal in Chittoor district, he offers his services to farmers in Karnataka. He dares anyone to prove him wrong. But the families of farmers who have committed suicide in Chittoor say Redappa has failed several times. For Redappa these are only allegations and he "does not know these people".

VISAKHAPATNAM

While the dry regions of the state take the lead in the number of borewells, coastal areas are not far behind in groundwater exploitation.

Donkina Jaleswar Rao, former sarpanch of Butchayyapeta village, borrowed Rs 60,000 from a moneylender two years ago for digging a borewell in his 0.6 ha. Despite drilling to 100 metres, he could not find water. He has a debt of Rs 1.4 lakh and has no clue how he will clear it. The rig owner charged him Rs 80 per foot (0.3 metres) of drilling; the pipe, called casing, came for Rs 250 per 0.3 metres. He

gave up after 100 metres as he had spent all his money. "Now I have to depend on the rains for paddy and sugarcane," he said.

D Bheema Shankar Rao, deputy director of groundwater department, denied pressure on groundwater in the district. Groundwater in the 42 basins of the district was within the safe limit, and while the average groundwater level in the district during May was 8.2 metres, it was 5.57 metres in November, which was normal, he said.

With Visakhapatnam emerging as an industrial hub, organizations like Fishermen's Youth Welfare Association led by T Sankar have launched a campaign against groundwater mining by industries. Last year, Sankar wrote to the chairman of the state Coastal Zone Management Authority and the member secretary of the state pollution control board alleging that Hetro Drugs, a pharma company, was drawing water at Rajayyapeta village turning the water in surrounding areas saline. He is awaiting reply.

There is an undercurrent in Tagarapuwalsa town, 25 km from Visakhapatnam, against Divi's Laboratory. The pharma unit has set up a pump house with four borewells on the banks of the Gosthani, which serves the drinking water and irrigation needs of over a million people. Rao, though, said the unit had not polluted the river.



The borewell drill

Before a borewell is drilled

- Farmers are mandated under the Water, Land and Trees Act, 2002, to apply to the mandal revenue office for permission
- The mandal revenue office sends the application to the district groundwater office
- Officials from the groundwater office are required to investigate the site and grant permission accordingly
- Clearance is a must before a borewell is drilled

After a borewell is drilled

- Farmers buy a motor, which costs between Rs 10,000 and Rs 15,000
- If borewell yields water, farmers need to apply to AP Transco for power connection. This is easy to get. The connection is free and farmers receive seven hours of power in two shifts. Farmers sometimes need to pay Rs 20 per month towards the cost of electricity

What it costs

- Pipes, called casing, cost Rs 200 per feet (0.3 metre)
- Drilling costs vary from place to place. Rig owners charge Rs 50 for the first 60 metres and the amount goes up Rs 10 for every consecutive 30 metres
- Water diviners and geologists, who help locate the right spot for drilling, charge between Rs 500 and Rs 2,000
- Farmers need to pay for the transportation cost of the rig, between Rs 700 and Rs 1,000

WHAT RULES?

Farmers take no permission, officers do not survey wells

The Water, Land and Trees Act (WALTA) was enacted in 2002. Meant to regulate groundwater use, the Act requires farmers to register their borewells with the mandal revenue office after getting clearance from the district groundwater office. Farmers like Muniratnam Naidu in Chittoor district laugh at the idea of taking permission. "All one needs to do is hire a rig, pay money to a geologist and drill a borewell," he said.

T Basavaiah, deputy tehsildar of Chittoor district's K V Palle mandal, admitted to widespread violation of WALTA in the district. "We have seized three borewells this year for which permission was not sought," he said. But the Act has helped monitor and record the extent of groundwater use and generated awareness among farmers, said A K Jain, special secretary to the state's irrigation and command area development department.

Farmers consider groundwater their right. "The authorities have not provided us with alternative sources of irrigation. How can they stop us from finding something that is ours?" asked K Basappa, resident of Ramanapalli village in Mahabubnagar's Hanwada mandal. Basappa drilled three borewells between 2009 and 2010 and did not apply for permission. No one questioned him either, he added. Hanwada mandal's revenue officer, Anjana Devi, maintained no one could drill borewells without their knowledge.

Basappa said at least 300 borewells are functional in his village; there is no count of failed borewells. But the data with the mandal office shows one farmer sought permission to drill a borewell and only one drilled borewell without permission, which the district officials stopped well in time.

Officials get to know of borewells only if there are complaints, which are rare, said Basappa. Often if one farmer strikes water, his neighbour attempts to drill a borewell close to that spot. If there is disagreement between two farmers, cases go to the mandal revenue

officer. After investigation, either one or both the borewells are sealed.

Mandal revenue officers claim they submit monthly reports to the groundwater department on the number of borewells. The revenue inspector and the village revenue officer are mandated under the law to visit each borewell site for verification. Farmers say officials hardly ever conduct field surveys.

Then there are bribes

Bal Swami of Burugupalle village in Mahabubnagar district said he tried to get permission for two borewells six years ago. He was denied permission but decided to get them drilled.

"We are required to go through different departments and that makes it tough. Bribes for permission can be expensive," he said. In some cases farmers bribe mandal officials for power connections instead of taking permission, said B Peddiraji, tehsildar of Butchayyapeta in Visakhapatnam district. He admitted to WALTA violations. He said he received 100 applications for drilling borewells in Butchayyapeta mandal this year but the actual number of borewells drilled would surely be double. "They are doing it illegally all the time," he said.

In East Godavari district some farmers drill borewells without permission





Farmers say they don't need permission to drill borewells because it is their right

but manage approval certificates and power connections. Narisi Srinivas of Pydikonda village in the district's Thondangi mandal said he spent Rs 85,000 on his borewell, which included money paid for clearances. The practice is rampant in the area, he added.

The tehsildar of Thondangi, C H V R Sudhakar, denied the bribery charges but admitted WALTA is violated. "It is not possible to verify everything physically. We received 85 applications for borewells this year; 40 were granted permission. We found people had sunk borewells at sites different from the ones mentioned in their applications. We have cancelled a few permissions because some of the applicants failed to maintain a minimum distance of 250 metres between two borewells, as is stipulated in WALTA," said Sudhakar.

Jain, though, claimed that the legislation had facilitated complaints. He gave the example of a water bottling plant in Ranga Reddy district, which was shut after residents complained about it last year. He also said his department was framing policies to demystify the belief that groundwater is farmers' property. "Farmers need to realize that groundwater is not an infinite resource," he added.

The Water, Land and Trees Act is meant to regulate groundwater use but departments do not coordinate

Although WALTA is one of the best pieces of legislation on groundwater use it has not been effective on the ground because of lack of coordination between departments, said Palla Narendra, a hydrologist and associate professor at the Tata Institute of Social Sciences in Hyderabad.

Bappu Reddy, a farmer in Medak's Yavapur village, said technology is the need of the hour. "We need technological assistance to locate groundwater," he said.

WALTA is under review, said C Suvarna, special commissioner at the state rural development department. "We will either improve it or bring in a new law. We will involve experts and NGOs before formulating the policy," she said.

"To get permission for a borewell we are required to go through different departments. Bribes for permissions are expensive"

—BAL SWAMI, *Burugupalle village*

HIGH STRESS

Groundwater levels in the state in free fall

The quantum of groundwater Andhra Pradesh received earlier from 100,000 borewells is now obtained by drilling 260,000 borewells, said A K Jain, special secretary to the state's irrigation and command area development department.

B Peddiraji, tehsildar of Butchayyapeta in Visakhapatnam district, added there is tremendous pressure on groundwater, with the level down to 91 metres in most villages. For instance, he cited, "Butchayyapeta mandal depends heavily on borewells as assured irrigation facilities are available only in three of its 32 panchayats."

The April 2010 groundwater level report also said groundwater levels in the state is falling fast. Compared to last year there was a fall of 23.15 metres in Dhone mandal of Kurnool district.

More than 80 villages across the state have seen a fall of more than four metres between 2009 and 2010, the report said.

"The fall of groundwater cannot be pegged to one cause (borewells). It is the result of deficit and infrequent rain, reduction in recharge area and lastly, over exploitation," said Murli Krishna, director of the state's groundwater department.

The April 2010 report also says that the groundwater level on an average in Andhra Pradesh has fallen 12 metres below ground level in the past year, the lowest since March 2007. Between May 1998 and March 2010 the water level has fallen two metres below average in the state (see *graphs*).

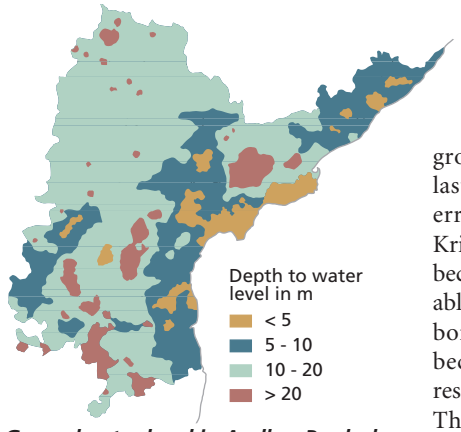
Despite heavy rains in 2008 the groundwater levels have only marginally risen in the state. According to officials the continuing fall is because of uneven rainfall across the state.

"Rainfall is the main source of groundwater recharge and during the last decade this source has become erratic and sometimes very low," said Krishna. "People resort to groundwater because it is economical and easily available, and it consumes less time to drill a borewell," he added. This is more so because of the limited surface water resources and their uneven distribution. Thus the strain on groundwater aquifers, mostly in upland areas, is increasing every day, Krishna said.

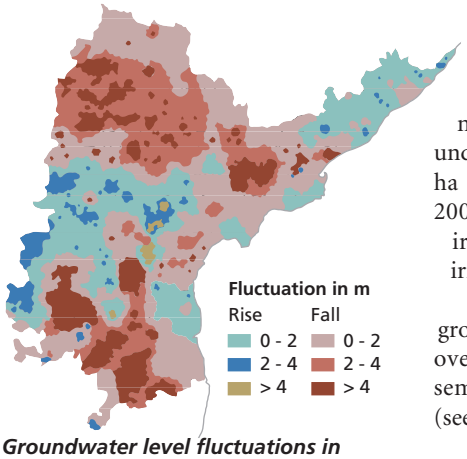
According to the Bureau of Statistics and Economics in Hyderabad, the total cultivated area in the state in 2008-09 was 6.7 million ha. Of this, 3.3 million ha was under surface irrigation and 3.4 million ha under groundwater irrigation. In 2006-07, the area under groundwater irrigation was 2.8 million ha, surface irrigation was 3.1 million ha.

As per the 2006-07 data of the groundwater department, there are 132 overexploited basins, 89 critical, 175 semi-critical and 833 safe basins (see *table*).

Andhra Pradesh is divided into 40 drainage basins and 81 sub basins of major and minor rivers. The 81



Groundwater level in Andhra Pradesh in May 2010

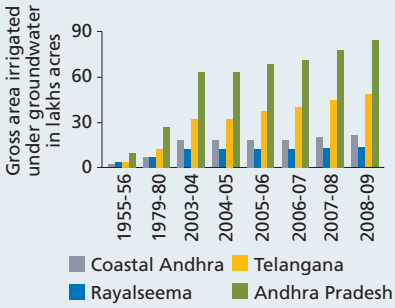


Groundwater level fluctuations in in May 2009 and May 2010

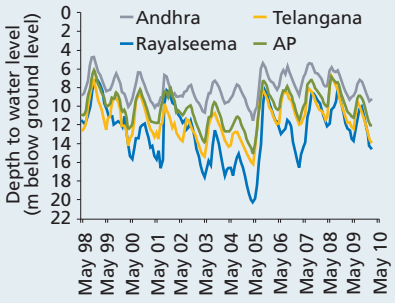
Source: Andhra Pradesh Groundwater Department

GROUNDWATER STATUS

Total area under irrigation by groundwater



Monthly average of groundwater levels in Andhra Pradesh



Classification of basins

Regions	Safe	SC*	Critical	OE*	Total
Coastal Andhra	367	20	6	11	404
Rayalseema	153	65	41	72	331
Telangana	313	90	42	49	494
State total	833	175	89	132	1,229

**SC: Semi critical; OE: Overexploited*

Changing scenario

Years	Type of wells	Yield	Well density /sq km
1982	Dugwells	60 - 150 cu.m	< 5
1983-84	Dugwells/ Dug cum borewells	60 - 150 cu.m	5-10
1984-94	Dugwells/ borewells	40 - 100 cu.m	> 10
1994-98	Borewells/ Dug cum borewells	30 - 60 cu.m	> 15
1998-08	Borewells/ Few dug cum borewells	20 - 40 cu.m	> 20

Source: Andhra Pradesh Groundwater Department

sub basins are divided into 1,229 groundwater micro basins of 100-300 sq km area based on drainage, geomorphology and hydrogeology. There is an addition of more than 50,000 groundwater extraction structures every year, said Krishna. In the last three decades well population—borewells and dugwells—increased from 0.8 million to 2.5 million.

But there is no record of the borewells that are dug illegally, admits C Suvarna, special commissioner at the state rural development department. The reason, she said, was the district water management authority under the groundwater department does not send them regular data. "When we question them they say the line departments, which include the mandal revenue office and the power department, do not submit any information to them," she added.

They can just count the number of transformers in villages to find out the number of borewells, said Narshimha Reddy, a farmer from Velgonda village in Mahabubnagar. A 100 KW transformer supports 20 borewells.

Officials of the groundwater department say they collect and collate data in the state and have no policy-making or law-enforcing powers. "We are a technical department and can only assist other implementing agencies like the irrigation department and the rural development department in water conservation or regulation projects," said Krishna.



"The quantum of water that was received by drilling 100,000 borewells is now obtained by drilling 260,000 borewells"

— A K JAIN, *Special Secretary, Irrigation and Command Area Development*

REACH OUT

State is trying to get farmers to budget water

The million-odd users of groundwater in Andhra Pradesh need a new form of regulation, everybody agrees. The system based on permits—under WALTA—only adds to the transaction cost of farmers. The fact is there is a desperation to dig and then dig deeper. There is no estimation how much the farmers—private entrepreneurs—of the state have invested into building the irrigation system. This investment is critical for farmers, but they must also ensure its sustainability. The state is beginning to look for new answers to the groundwater challenge: how can it involve the farmers—the individual decision makers—in taking better and informed decisions about this collective wealth, which is not easily seen or estimated?

In 1996, work began through the Dutch government-funded Andhra Pradesh wells project, which focused on funding farmers to drill borewells. The project linked the wells to building tanks in the village, promoting recharge. In 2004, the Food and Agriculture Organization (FAO)-funded Andhra Pradesh Farmer-Managed Groundwater System was launched. It looked at training farmers on understanding groundwater regimes and exploring how this learning could influence communities to change their use of groundwater by switching crops. In 2008, a World Bank-funded project started in collaboration with the groundwater department, with a tank component called AP Community Based Tank Management programme and a small component on groundwater called Participatory Groundwater Management.

T N Reddy of MANAGE, a non-profit in Hyderabad involved with the FAO-funded project, said it is important to get farmers to take note of the common water system. According to him, the FAO project was also aimed at explaining to farmers the seasonal changes and distribution of groundwater so that they estimate and use it accordingly. "But the project was limited in its spread and did not have the desired impact," he said.



Project in Yavapur village has roped in farmers to monitor groundwater use

His evaluation is that in the 600-odd villages covered under the project, roughly half the farmers changed their cropping patterns to less water-consuming crops. "There is a long way to go before we can improve groundwater levels across the state," said Reddy.

Groundwater irrigation is linked to what farmers can earn from crops. "You cannot expect farmers to shift crops or reduce their water consumption without providing alternatives or giving them market support," said Palla Narendra of the Tata Institute of Social Sciences in Hyderabad.

NREGS non-connection

In addition, the state is making investments under the Centre's employment programme, NREGS. Between 2009 and 2010 the government undertook 850,000 works, of which 75 per cent were categorised under water conserva-



tion. These works included desilting of tanks, soil moisture conservation and construction of water harvesting structures. This investment should have improved groundwater regimes. But there is little evidence of that.

The problem is the lack of data. No government department takes charge of looking at the impact of the public works on the water system. C Suvarna, special commissioner in the state rural development department, explained, "Groundwater is a difficult issue. The state government has projects going on all over the state. But groundwater levels are falling. The departments involved with regulation, management or policy-making seem to be working piecemeal."

Involving farmers

The ongoing World Bank-funded project of the irrigation department requires the community to identify borewells that fall within the command area of the village's biggest tank and record the groundwater level over a period of time. Under this project, spread mostly in dry and drought-affected areas of the state, some 315 tanks were selected in 13 of the total 23 districts. These tanks fall under the 161 over exploited and critical groundwater basins in the state. Till July 2010, farmers in 20 per cent of the villages were discussing crop water budgeting after monitoring their groundwater for two years. "The actual change in cropping patterns has not yet been seen. But with debate, farmers' awareness increases. This is the first step to the big change," said Eswara Reddy, capacity building expert with the project.

The idea behind involving farmers to monitor groundwater is that they switch to less water-intensive crops

The idea is catching on in Yavapur village in Medak district, some 100 km from the state capital. Here the project started in 2008 and villagers now record water levels every 15 days in the four borewells in the command area of the village tank. The department has provided people with equipment, including a groundwater gauge. The deal is they will measure and record data in registers kept at the panchayat office.

In this water-starved region, villagers grew paddy and sugarcane during monsoon, and maize in winter. Farmers explained things were changing fast and that water table was falling. Borewells were drying up or giving less water each season. The Peddachevru tank, the village pride, with a catchment of 68 ha and irrigating 87 ha had gone dry this year—the first time in their recorded memory. The groundwater level in the village was already between 76 and 91 metres.

Under the project, the village has mapped its water systems: the village with 409 households has some 600 functional bores. In addition, it has three big water tanks and many small tanks, which are used for irrigation and recharge of groundwater.

P Laxma Reddy, president of the village water association, believes people will shift to crops that require less water. "Since we started recording groundwater we know how much water we are consuming. We can now calculate how much water and power we need to grow a particular crop," he said. According to him, if paddy requires 50 litres of water, sugarcane needs 30 litres and maize 15 litres. Now based on this rough estimation, budgeting has to be done.

But as yet, people in the village seem unconvinced. The groundwater monitoring is showing an overall decline—some 0.5 metres over the last season—in the four monitored wells. People say this is because of poor rainfall last year. As yet, the declining water levels have not deterred them from digging for more liquid gold—in just last year, Yavapur has dug another 50 borewells, of which they struck gold in 10. ■



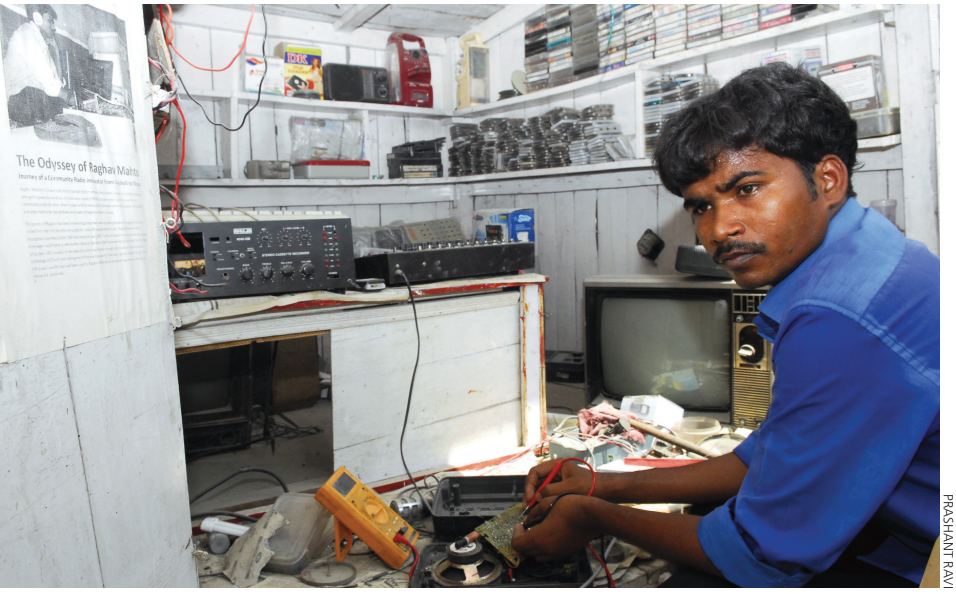
Voice cracked

A radio-mechanic-turned-entrepreneur who made it to NCERT textbooks—and penury

ALOK GUPTA *Vaishali*

It took two two-and-a-half-metre bamboo poles and a small transmitter worth Rs 50 to start Radio FM Mansoorpur in Bihar's Vaishali district. The radio station, started in 2002 by Raghav Mahato, a radio mechanic, shut four years later because he did not have a licence.

Mahato, now in his late 20s, did not know he needed a licence and a government approved transmitter to run a radio station till a team comprising CBI and information and broadcasting ministry officials raided and sealed his radio station at Mansoorpur village. He could not afford a transmitter, which costs Rs 3.5 lakh. Even now, he does not have money and is thinking of joining a brick kiln as a daily wager.



PRASHANT RAVI

Raghav Mahato at his erstwhile radio station

His financial condition notwithstanding, Mahato is famous. NCERT (National Council of Education, Research and Training) devotes a chapter, Social Change and Development, to Mahato in its sociology textbook for class XII. Mahato, though, has no inkling that students across the country are drawing inspiration from his innovation. "Everyone has exploited me. I am leading a life of penury," he said when he learned of the chapter on himself. He would do anything to go back to the good old days of Radio FM Mansoorpur, he said.

Within two weeks of its launch, he recalled, villagers flocked to his radio station to air messages about missing cattle, panchayat meetings and even wedding dates. The radio helped trace six missing kids and three buffaloes in its four years of existence. It also played popular numbers in Bhojpuri and Hindi, sometimes on demand. "It was healthy entertainment for us. We nearly controlled our drinking habit," said Laxman Rai, a 42-year-old farmer who would go to Mahato with his list of favourite songs everyday after dinner.

The popularity of the radio station became its undoing. When the team of officials raided Mahato's shop, they said the radio station was illegal and that Mahato was a threat to national security. Mahato could not comprehend the allegations. The team insisted on Mahato's arrest, but the officer-in-charge at the local police station came to his rescue. He was a fan of Radio FM Mansoorpur and would regularly send his list of Bhojpuri songs.

Mahato was told about the need for a licence and the transmitter atop a bamboo pole on the district hospital was brought down. That is how the station's life ended, Mahato said. It had taken him three days to make the transmitter, the idea for which he had got while repairing radio sets, he added.

Non-profits tried to help him get a government approved transmitter but in vain. Frustrated with the turn of events, and with no job in hand, he moved to Tilonia village in Rajasthan's Ajmer district. There, he trained physically disabled women in repairing radios at Barefoot College, an NGO. But that proved unviable. The college gave him Rs 100 per day and free accommodation. He continued in the hope of a raise, which never came. He quit last year because of financial problems back home and returned to Mansoorpur.

Mahato's radio station would air messages about missing children and cattle, and play Hindi and Bhojpuri songs

Since his return he sought help from different quarters, including local leaders, but nothing worked out. "I am a poor MLA and unable to help," said Basawan Bhagat, former legislator from Bhagwanpur. "We miss the radio station," he added. Shivnath Sharma, a cricketer who organized matches in Mansoorpur said with the radio gone, live commentary is not possible anymore. "Tournaments now seem dry," he said.

Mahato wants to start community radio. He knows the rules now, he says, but he does not have Rs 3.5 lakh.

More than that, he is worried about clearing a debt of Rs 10,000. And provide meals for his family. ■



APARNA PALLAVI / CSE

At Rs 25,000, the pump is expensive for small farmers. It requires a subsidy

Electric cattle

Bullock-powered pump to tide over farmers' electricity woes

APARNA PALLAVI *Indore*

A pair of bullocks operating an iron contraption is a big draw at Melkama village in Indore district. The brainchild of Vinod Parashar, a scientist at Shri Govindram Seksaria Institute of Technology and Science in Indore, the device has an unwieldy name, 'Linkage-based input-output shaft'. But don't go by the sound of it. The farmers thronging Melkama believe the device could help them draw irrigation water, a resource made scarce by electricity shortage in Madhya Pradesh.

The bullock-powered device can draw 6,000 litres of water from a well or borewell in an hour. Since the bullocks complete about two-and-a-half turns in a minute, the amount of water lifted per minute is approximately 100 litres at two litres per stroke, Parashar said. At this rate, 36,000 litres can be lifted in six hours, enough to irrigate a two-hectare farm (see: 'How the pump pumps). Although bullocks have been traditionally used for drawing water for irrigation, Parashar's device does it more efficiently.

The scientist has installed a prototype device at Melkama. Elderly Bansilal, the farm's caretaker, has been operating the pump for six months. "If an electric pump develops a snag in the mid-season, it takes a farmer several tense days and a lot of expense to repair it. This pump is so simple there is little scope of its going wrong, leave alone repairs," he said.

The pump has also caught the fancy of politicians and bureaucrats. Parashar has received several orders for demonstration pieces from people's representatives, including Ratlam city MLA Paras Jain and an Indore corporator, Balram Verma.

Money matters

But there is a hitch before the device becomes a feature in small farms. At Rs 25,000 per unit, the pump is too expensive for a marginal farmer, Parashar admits. He thinks a subsidy is needed to popularize it among small and marginal farmers.

P K Padlikar, an engineer in Madhya Pradesh's agriculture department, believes the government could use the pump in its drip irrigation scheme. If the government installed drip irrigation equipment and subsidized the construction of a tank to store the water drawn, the water could be used on a larger tract, he said.

Parashar has applied for a patent. "Otherwise the device might be appropriated by big businesses," he said. Once he gets the patent, the scientist intends to organize training sessions for village welders with the help of government and non-government agencies. ■

How the pump works

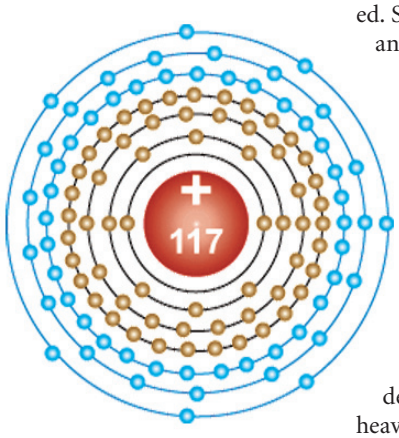
The pump is based on the simple technology of a tubewell operated by a driver wheel and two levers. The driver wheel is planted in the ground, some 20 feet from the wellhead.

It is connected with a lever, which is yoked to a pair of bullocks. As the bullocks move around the wheel in a circle of 15-foot radius, the wheel also turns, moving two other levers, also planted in the ground and connected with the wheel. The two levers are in turn connected to the tubewell shaft.

One lever moves the piston of the well shaft up, while the other pushes it down, facilitating the lifting of water. The pump can be made, installed and repaired at the village level. Earlier pumps made by other scientists did not have this advantage. "With a brief training, any village welder can make eight-10 units per month," Parashar said. Iron rods and 'angles' are available at village markets and welders can make the pump, wheel and levers.

CHEMISTRY

...and now 117



Periodic table posters in science labs need to be updated. Scientists from Russia and the US have synthesized a super heavy radioactive element with atomic number 117. They have named it ununseptium or Uus, until the International Union of Pure and Applied Chemistry decides on a name. Uus is the immediate decay product of the heaviest radioactive element 118, or ununoctium. Understanding its properties may take some time because Uus remains stable only for 78 milliseconds. The scientists said synthesizing the element is a major step towards discovering stable superheavy elements that could last for a very long time, even approaching billions of years. Except plutonium and neptunium, none of the elements beyond atomic number 92 (uranium) occur naturally.

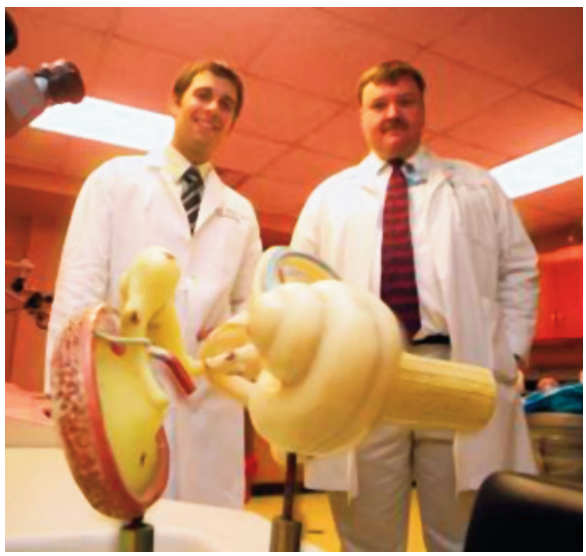
Physical Review Letters, April 6

TECHNOLOGY

Cochlear implant goes deeper

US scientists have upgraded the conventional cochlear implant, a hearing aid. The upgraded device has more electrodes and a thinner, more flexible wire that can be inserted further into the cochlea, the inner ear where the auditory nerves are bundled. A team of scientists from the Medical College of Georgia and the Georgia Institute of Technology said more the electrodes on the nerves, the better the sound. The device would thus offer an improved sound resolution. Since the snail-shaped cochlea is difficult to access, the thinner wire can easily pass through the tube, lowering the risk of damaging the ear during implantation.

International Conference on Cochlear Implants and other Implantable Technology in Sweden, June 30-July 3



Upgraded cochlear implants for better sound resonance



ASTRONOMY

A star is born

Astronomers recently captured the image of a star just as it was being born out of the surrounding gas and dust in the galaxy. It was the most detailed glimpse of the initial stage of star formation till date, said the group of astronomers from USA and Germany. They observed that the future star, L1448-IRS2E, was ejecting streams of high-velocity gas from its centre, which means some prelimi-

ECOLOGY

Flowers attract rain



Flowering plants keep the surroundings pleasant and wet compared to non-flowering plants. In fact, in the Amazon rainforest replacing flowering plants with non-flowering varieties would reduce 80 per cent of the area that always remains covered by wet rainforests. Scientists from the University of Chicago in USA said high leaf-vein density of flowering plants is responsible for this. High vein density means better absorption of CO_2, a greenhouse gas, and more transpiration to herald the rain, they said.

Proceedings of the Royal Society B, June 16

HEALTH

Healthy, but could be toxic

The popular belief is hens living outdoors with plenty of fresh air and sunshine, and foraging on a grass range lay eggs that are healthier than those laid by caged hens. Not necessarily. Scientists have found free-range eggs in Taiwan contained 5.7 times more carcinogens like polychlorinated dibenzodioxins and polychlorinated dibenzofurans than regular eggs. The chemicals are mostly released by municipal incinerators in Taiwan. Free-range hens get exposed to higher levels of environmental pollutants, the scientists cautioned. *Journal of Agricultural and Food Chemistry, June 3 (online)*





nary mass has already formed. They took the image using NASA's Spitzer Space Telescope. It is, however, difficult to see the mass in the image because stars emit very little light in the formation phase. Located 800 light-years away from the Earth, in our own Milky Way galaxy, L1448-IRS2E is a few thousand years old. The group plans to use advanced space telescope to observe more stars in the intermediate stages of formation to understand how they grow and evolve. *Astrophysical Journal, June 17*

BIODIVERSITY

Corals plan their own evolution

Coral reefs are struggling with ocean acidification, higher water temperatures and destruction caused by humans. To save these ecosystems, conservationists mostly focus on the centres of reefs where coral diversity and density is high. A group of American and Australian scientists has urged the focus needs to be changed. They studied the Caribbean reefs and observed corals on the outer edges of reefs spur innovative evolution to help a reef adapt to more acidic, more polluted and warmer oceans. Conservationists should expand their strategies to the outskirts of the coral ecosystem where the evolution is happening, they said. *Science June 18*



ENVIRONMENT

Now, arsenic in Gulf of Mexico

About 400 millions of litres of oil has gushed into the Gulf of Mexico since April, and along with it a large amount of arsenic. The toxic chemical is present in fossil fuel. Arsenic also occurs naturally in the ocean water. But seafloor sediments cleanse it by bonding with arsenic and subsequently burying it under new layers of sediments. This keeps the levels of naturally occurring arsenic low. Researchers from the Imperial College London have discovered oil spills can clog up the sediments, preventing them from bonding with arsenic. This causes arsenic levels in seawater to rise, contaminate the marine ecosystem and eventually enter the food chain. *Water Research, July 2*

RENEWABLE ENERGY

Improved solar cells

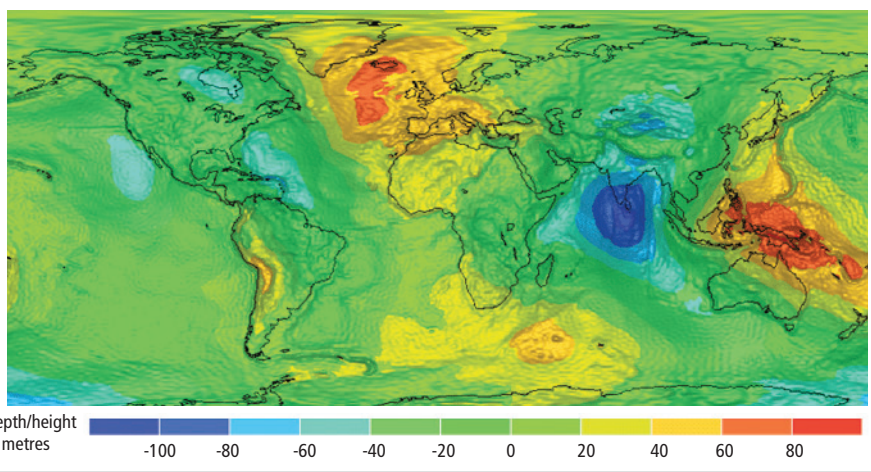
Sunlight is an abundant source of energy. But conventional solar cells are able to convert just 31 per cent of the light into power. Most of the sunlight that falls on solar cells gets lost as radiation and heat before it can be trapped by the silicon semiconductor. Scientists at University of Texas in USA said the efficiency of solar cells can be improved by reducing the loss of energy. They have found replacing the silicon semiconductor with lead selenide reduces the loss of energy through reflection and doubles the efficiency of solar cells. *Science, June 18*



GEOPHYSICS

Mapping Earth's gravity

Using initial data provided by the gravity-tracking satellite GOCE, European scientists prepared a map that traces the Earth's gravity. The map shows how Earth would look like if it was covered with an ocean dictated only by its gravity, which does not exert an equal force everywhere. The map will help scientists better understand Earth's internal structure and measure ocean circulation, sea-level change and ice dynamics. *Living Planet Symposium, Bergen, Norway, June*



LIFE SCIENCES: *cell metabolism*

Pills can break bone

Studies explain how drugs for asthma, diabetes cause osteoporosis

TIASA ADHYA

LATELY things have not been going smoothly for Koel Dutta. A homemaker in Kolkata, the 38-year-old has asthma. Doctors have put her on Pediapred—a class of glucocorticoid steroids—for the past one year. Since January, Dutta was getting fractures easily. Once she tripped on the doorstep and fractured her wrist. The next time she fractured her lower spine while lifting a heavy bucket. Worried about her condition, doctors asked Dutta to get a bone mineral density test done.

Her neighbour Ishan Kumar also got a bone scan. The 48-year-old tax consultant is suffering from epithelial tissue cancer for the past one year and has been prescribed Dexamethasone Intensol—another class of glucocorticoid steroids. Test results revealed both Dutta and Kumar have osteoporosis.

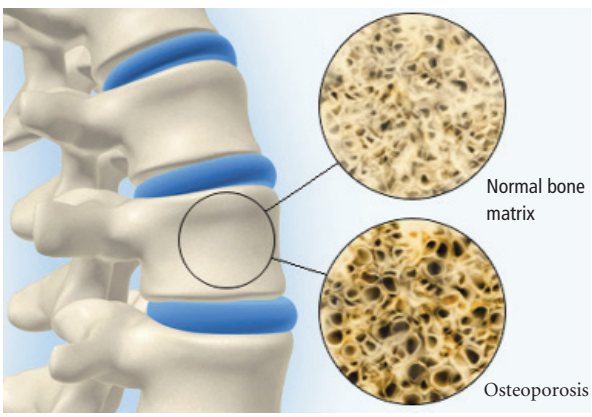
Sabyasachi Sen, physician at the Gamma Centauri Nursing Home in Kolkata, said taking glucocorticoid pills for more than three months raises the risk of osteoporosis.

To avoid the bone loss disease Sen recommends daily doses of calcium and vitamin D supplement along with weight exercise for at least 30 minutes for those who are on long-term glucocorticoid medication.

Two independent studies by scientists at University of Texas Southwestern Medical Center in USA and Fritz-Lipmann Institute in Germany support Sen's diagnosis. They recently shed light on why some commonly used drugs can increase one's odds of breaking bones.

Glucocorticoids, a class of steroid hormones, play a vital role in the treatment of ailments like asthma, arthritis and gastrointestinal diseases. High glucocorticoid levels in the body interfere with the absorption of calcium from the intestine. As a result, the body seeks out calcium from the bones and causes osteoporosis.

This is not all, said the team led by Jan Tuckermann of the Fritz-Lipmann Institute. High glucocorticoid levels also hinder bone formation. Bone is a dynamic tissue—it constantly remodels through a careful balance between the activities of bone-building osteoblast cells and bone-destructing osteoclast cells. Osteoporosis occurs when destruction outpaces formation.

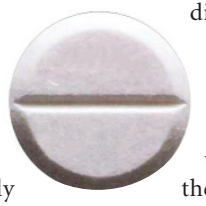


Osteoporosis causes 8.9 million fractures worlwide every year, according to the World Health Organization

The team conducted experiments on mice and cultured cells. Glucocorticoid binds to its receptor present in almost every cell in the body and enters the cell. Together they supress the activity of a protein-forming factor, AP-1, which controls the activity of osteoblasts, the scientists observed. This inhibits the rate of bone formation and leads to osteoporosis, they reported in the journal *Cell Metabolism* on June 9.

The mice in whose body scientists had suppressed glucocorticoid receptors did not show bone loss. "Our research suggests that selectively acting glucocorticoid that spares AP-1 could protect the bone while still helping asthma patients," said Tuckermann.

Another study lead by Yihong Wan from University of Texas Southwestern Medical Center focused on a drug, Rosiglitazone, recommended to diabetics. Excessive use of the drug also leads to increased fractures.



The drug combines with a receptor, PRARg, present on the cell membrane. Together they activate a protein PGC1b, which, in turn, works with estrogen-related receptors to stimulate the formation of osteoclast cells. "Deletion of PGC1b has been found to confer complete resistance to Rosaglitzone-induced bone loss," Wan noted in the same journal.

Hope for advanced drugs

Early effects of glucocorticoids on bone can be reversed by the administration of bisphosphonates, a class of drugs, said Ernesto Canalis from Saint Francis Hospital and Medical Centre, Hartford, USA. Parathyroid hormone, which increases the concentration of calcium in the blood, can also help reverse the inhibitory effects of glucocorticoids on bone formation, Canalis added. Yasuhiro Tamura, endocrinologist at Teikyo University School of Medicine in Japan said genistein, a hormone in soy food, can also protect bones from the effects of osteoporosis.

Wan assures that based on her study, it is possible to design advanced diabetes drugs that would not cause osteoporosis. ■

GEOLOGY: *earthquake prediction*

The big aftershock

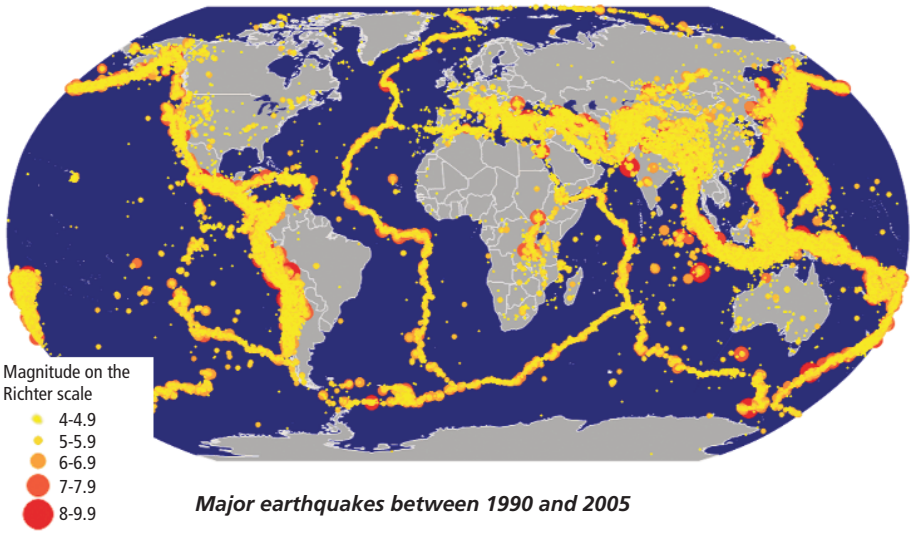
Quake activates nearby faults, triggers more quakes

SUSMITA DEY

THOUSANDS were killed and millions affected when a 7.2 earthquake struck Haiti early this year. It flattened much of the capital, Port-au-Prince. Seismologist Christopher Scholz has warned that a major earthquake does not mean the future risk is lower; it's higher.

Scholz, who works with Lamont-Doherty Earth Observatory in USA, said major earthquakes can trigger quakes at nearby faults. When a fault ruptures in a major quake, the movement releases energy built up over thousands of years and transfers some of it to faults within 50 km. For the second fault to rupture it must be at its breaking point, said Scholz. Every active fault follows its own seismic cycle and with successive ruptures, their seismic cycles lock phases. Such synchrony is called phase locking or entrainment.

Scholz is not the first to observe entrainment. It was first observed and coined by physicist Christian Huygens in 1666 when he saw two pendulum clocks with different oscillatory patterns swinging in rhythm as they were placed together. Scholz first found the evidence of phase-locked faults in California's Mojave Desert. In the 1990s, a series of quakes jolted the desert. The 7.3 magnitude Landers earthquake at the Camp Rock fault struck in 1992. It was followed by the 7.1 Hector Mine quake in 1999 at the Pisgah fault, some 24 km away. This, in turn, ruptured other minor faults. A volley of quakes measuring between 5.2 and 6.1 on the Richter scale had preceded Landers and was believed to have triggered it. Scholz said the Landers quake transferred a small amount of stress to the Pisgah fault, causing the Hector quake. The Camp Rock and Pisgah faults have seen bursts of seismic activity separated by several thousands of years even in the past, noted Scholz in the *Bulletin of Seismological Society of America* in June.



Major earthquakes between 1990 and 2005

Susan Hough of the US Geological Survey said, one can dissect and understand triggered earthquakes. But the occurrence of one quake tells us very little about when and where future large earthquakes will happen, she added. ■

HEALTH SCIENCES: *disease interaction*

Worms can be good for kids

Protect against malaria-induced anaemia

SUGANDH JUNEJA

SEVERE anaemia is the major cause of death in malaria patients. Soon after infection, parasite *Plasmodium* invades red blood cells and bursts them, causing anaemia. Controlling malaria has been a challenge for Asian and Latin American countries where helminthiasis, another anaemia-causing disease, is prevalent. It occurs when the body is infested with parasites like roundworm and hookworm. The worm sucks blood from the host's intestinal wall. Brazilian scientists have found the severity of anaemia decreases, rather than increasing, among those infected by both the parasites.

Since children are particularly susceptible to anaemia, the team led by Marcus Lacerda of Tropical Medicine Foundation of Amazonas, evaluated the influence of worm infection on the haemoglobin (Hb) level of children suffering from malaria.

They examined 216 children, in the age group of 5-14, from two villages in the state of Amazonas, where a malaria species, *P vivax,* is endemic. Fifty-four of them were infected with malaria. The team analysed their stool and blood samples on alternate days for six months. Analyses revealed, Hb levels in some infected children remained same as the baseline level. Eighteen of these children were also infected with giant roundworm, 11 with hookworm and nine with human whipworm.

The Hb levels among children infected with malaria alone, however, decreased significantly.

The Hb levels did not dip in those infected by both malaria parasites and intestinal worm, the scientists reported in the June issue of *PLoS ONE.*

Vas Dev at the National Institute of Malaria Research, Guwahati, said a similar study should be conducted in India where both the infections are prevalent. As per the National Vector Borne Disease Control Programme estimates more than 19.5 million people in the country were infected with the mosquito-borne disease and 1,068 were killed in 2009. The result is, however, premature to conclude because the authors studied a small sample, Dev said. ■

ENVIRONMENTAL SCIENCES: *pollution*

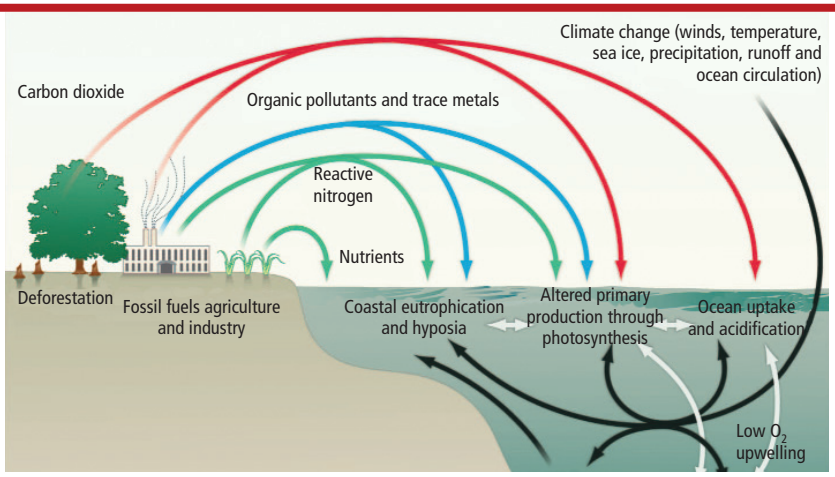
Ocean sours

At current rate seawater will turn acidic by century end

MANUPRIYA

HUMAN activities are affecting the ocean, altering its composition and damaging it bit by bit. Several researchers have documented this, but as isolated cases. Scott Doney, marine scientist at Woods Hole Oceanographic Institution in USA, recently reviewed researches in the past six years and evaluated the total impact of rising CO_2 and pollution levels, agricultural runoff and other human activities on the ocean.

In his article in *Science* on June 18, Doney noted since the industrial age the ocean has absorbed 25-30 per cent CO_2 released by human activities. If this continues, seawater woud turn acidic. The acid-base chemistry, or pH, of seawater is changing 30 to 100 times faster in recent years. It has decreased 0.1 unit in the past two decades. A further dip of 0.2-0.3 units by the end of the century would make the water highly acidic, Doney stated in the article. This would affect the marine ecosystem. For instance, calcium carbonate saturation decreases in acidic seawater. As a result, the calcium carbonate present in the coral and seashells would be eroded and they would not be able to build their skeleton or shells. Doney calls for a detailed documentation of compounds in the ocean and a coordinated monitoring plan of the marine ecosystem.



Human activities affect ocean dynamics

The overall impact of ocean acidification on the food web would be profound, said S W A Naqvi of the National Institute of Oceanography, Goa. The study is timely in the context of changes occurring in our own country's coastal environment, he added. ■

TECHNOLOGY: *food testing*

Detective poles

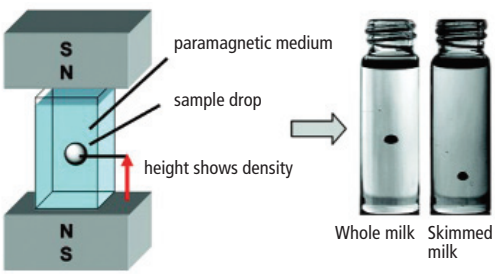
Magnets to check fat content of milk, adulterated oil

PRATIBHA NARAYANAN

A DEVICE based on a technology used in superfast trains can now be used to test the fat content of milk and cheese. The device that uses magnetic levitation can also be used to test adulteration of vegetable oil.

The density of a substance provides the key information about its composition, for instance, the sugar content of soft drinks, the carbohydrate content in a rice grain or adulterants present in vegetable oils. Most existing devices for determining density, such as chromatography and spectroscopy, can be deployed only in labs and are expensive. Scientists from Harvard University in USA have developed an easy-to-use device using maglev. As the name suggests, maglev is the process of suspending an object in air using magnets. When the like poles of a magnet are placed facing each other, they exert a strong repulsive force which keeps them apart. The repulsion can counter the gravitational force and keep the object suspended in air. The scientists used the technology to suspend solid or liquid samples to measure their density.

About 10 cm long, the device consists of a glass or plastic container filled with paramagnetic solution with magnets at each end. The solution creates a base to exert magnetic force on the sample in it. Since the magnetic field cancels out the gravity, the sample stabilizes at a height proportional to its density; the lighter it is the higher it moves in the solution. The height is correlated with the ideal density of the substance to evaluate the difference in composition.



Writing in the *Journal of Agriculture and Food Chemistry* in May, lead researcher George M Whitesides said maglev can be used to analyze solids, liquids and colloidal suspensions over a broad range of densities. Besides, it is inexpensive: the device would cost less than US $45 and the paramagnetic solution costs about US 5 cents per test.

The device has its limitations, though. The paramagnetic solution is different for testing different substances. The device can't point out which material is present in the sample and in what amount, said Savita Yadav, physics professor at Institute of Home Economics, the Delhi university. "Its utility would probably be restricted to areas like the pharma industry that require accurate measurements," she added. "For other uses like detection of adulterated milk and food, hydrometers and lactometers are enough." ■

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AGRICULTURAL SCIENCES: *symbiotic fungus*

Friends for rice

Third generation of a benign fungus could boost yield

TIASA ADHYA

THE benign mychorrhizal fungi live in a mutually beneficial arrangement in the roots of most plants. They help the plant absorb essential nutrients like phosphorous and in return receive carbohydrates from the plant. But they do not bond with major food crops like rice.

Swiss researchers recently claimed they can make a species of mychorrhizal fungus bond with rice.

The species, *Glomus intraradices*, has an unusual genetics. Each filament of *G intraradices* contains genetically distinct nuclei. But since it reproduces asexually, the genetic recombination does not occur. The ecologists at the University of Lausanne in Switzerland took spores of two *G intraradices* fungal filaments and fused their nuclei in the laboratory. The resulting spores had a different genetic combination. The researchers then cultivated the crossed fungi for three generations in the laboratory and inoculated rice saplings with different generations of fungi.

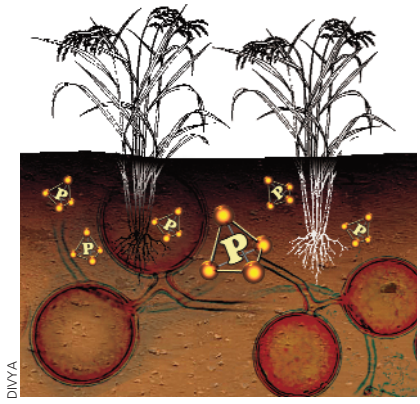
After 12 weeks, they observed, those inoculated with the third generation fungi grew two to five times faster than the others. Although the scientists are not sure why only the third generation benefitted the rice plant, Daniel Croll, co-author of the study said, "It's likely due to greater genetic variability."

Writing in *Current Biology* on July 13, the scientists said the method is natural and not genetic modification. Lead researcher Ian Sanders said, "What we did is not different from what plant breeders do to improve crops." The only difference is that the genetics of these fungi is a little bit more unusual, and no one thought it worth doing, Sanders added. His team hopes hybrid fungi can help plants use phosphorous present in the soil in complex forms.

Asia consumes more phosphorus fertilizer in proportion to crop yield than other regions, said biologist John N Lott, of McMaster University in Canada. With global shortage of phosphate in the soil predicted in the coming decades, mychorrhizal fungi developed through genetic recombination would reduce the use of fertilizers, Lott added.

Roland Buresh of the International Rice Research Institute in the Philippines, doubts if the fungi, which requires oxygen for growth, would grow well after being transplanted into submerged paddy fields with limited soil aeration.

The Swiss researchers acknowledge their work is not field-ready. Sanders is conducting field trials on potato and cassava with the National University of Colombia. He has been able to produce the same amount of potato with less than a third of the phosphate fertilizer normally applied. ■



DIVYA

ATMOSPHERIC SCIENCES: *rain patterns*

Size matters

Bigger aerosols trigger rain

RAIN comes from clouds. But where do clouds come from? Through the process of evaporation and transpiration, water vapour rises higher into the atmosphere, deposits on fine particles, such as dust, air pollution, pollen and bacteria, condenses and forms the cloud. These particles called aerosols act as a seed to unite tiny water droplets, which coalesce to form raindrops. Weathermen call them cloud condensation nuclei or ice nuclei. But not all aerosols floating in the higher altitude help in the formation and precipitation of cloud.

After studying clouds for 14 years, a team of scientists led by Paul DeMott with the Colorado State University in USA have concluded that based on the size, only one in a million of aerosols acts as ice nucleus.

His team used specially designed planes to collect air samples from in and around clouds from the Arctic to the Amazon. They measured in real-time the ice-forming ability of aerosols in the air surrounding growing clouds and subsequently the total number of ice nuclei present in the cloud wave. After evaluating 14 years of data, the scientists said the amount of ice nuclei necessary to form cloud is linked to the abundance of aerosols larger than 0.5 µm (a millionth of a metre) in diameter. There was an exception, though. Sea-salt aerosols of super-micron size do not act as ice nuclei, the scientists noted in the *Proceedings of the National Academy of Sciences* on June 22. They plan to study the anomaly.

The reasearchers cautioned unregulated release of aerosols into the atmosphere may lead to erratic rainfall patterns due to shrinking of rain drops and disturbance in rain cycle (see 'Aerosol pollution may affect rainfall pattern', *Down To Earth*, February 2007). ■

Paul DeMott in the plane designed to measure ice nuclei


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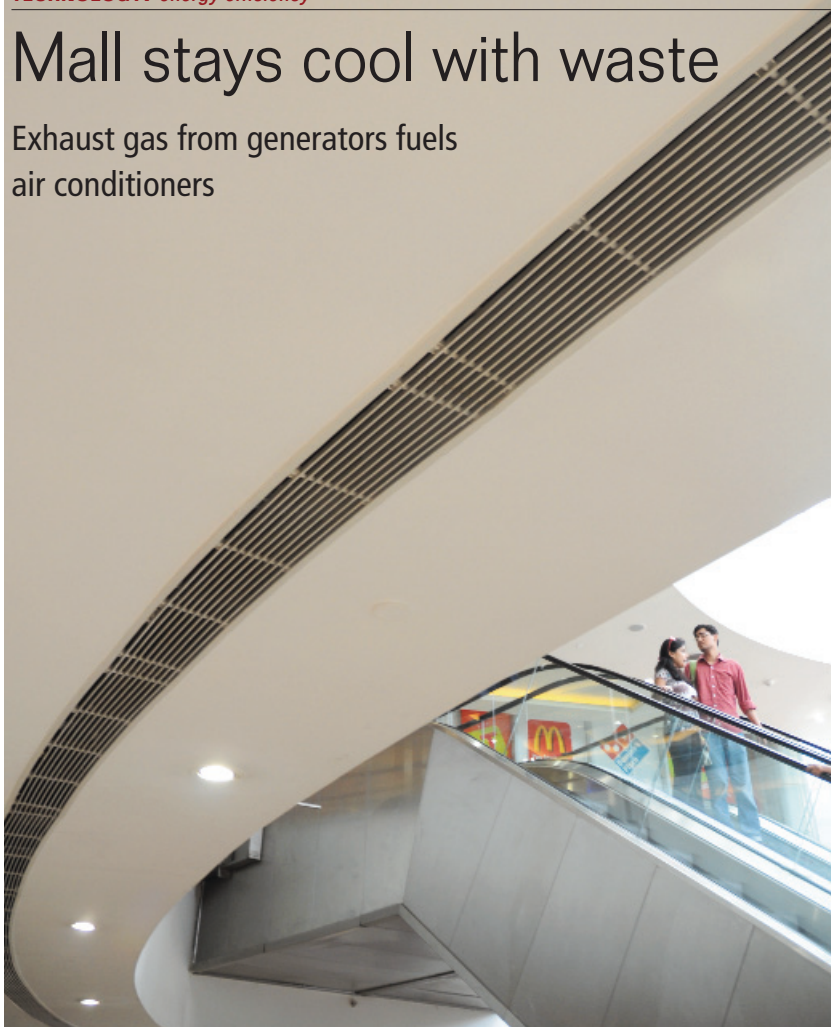
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TECHNOLOGY: *energy efficiency*

Mall stays cool with waste

Exhaust gas from generators fuels air conditioners



PHOTOGRAPHS: SAYANTAN BERA / CSE

RUHI KANDHARI

HARD Rock Cafe in DLF Place mall in south Delhi is air-conditioned but does not use electricity from the grid to run the system. The mall has its own captive source—generators that run on compressed natural gas (CNG). The air conditioning runs on exhaust from these generators.

The exhaust gases from the three generator sets that produce 1.4 MW each benefit 160 shops, 45 offices, a hotel and a six-screen multiplex. "The generators recover the exhaust and channelize it to vapour absorption machines (VAM); these then condition the air in the mall," said Sudhir Rawat, engineer in charge of DLF Place. The energy provided by exhaust gas equals to 1,500 tonnes of air-conditioning. "This would have required 1.8 MW capacity, but VAMs, which we imported from China, help us save that," Rawat said. As in the case of CNG car engines, generators running on CNG use only 40 per cent of the energy produced by the fuel; the rest escapes in the form of heat.

Heat is the basic requirement for air conditioning, and this can be acquired for free from hot exhaust gas and jacket water, which prevents engine parts from overheating, said Rawat. A VAM is a chamber with a coil running through it like an intestine. Hot air enters from one end of the coil, gets cooled and is released from the other end. The cooling is done by a mixture of lithium bromide and water in vacuum inside the chamber. From the generator exhaust gas and jacket water are channelled into a pipe and pushed into the VAM via an inlet. It evaporates the water in the chamber that clings to the outer surface of the coil. Lithium bromide then absorbs the heat from the vapour, cooling the air inside the coil in the same way sweat cools the body.

The installation that generates electricity using CNG and then uses the exhaust gas or waste heat for cooling the mall—called combined heat and power (CHP) system—is placed in the second level basement covering 300 sq metre.

Besides malls, office complexes are also using the CHP system to save energy. DLF has installed this technology in five office and mall complexes and is planning to install five more, C P Poonacha, executive director, DLF utilities, said.

Building number 10 in Gurgaon's IT Park has also brought down energy costs by using CHP. It has been functioning without a breakdown for three years.

Energy saver

Any kind of waste heat recovery is green technology; it helps reduce use of fossil fuels and emissions, said S C Kaushik, head of the Centre of Energy Studies, IIT Delhi. The CHP system has been around for quite some time, but India got acquainted with it, in terms of application, only recently, he added. The first US commercial power plant using this system was Thomas Edison's Pearl Street Station in Manhattan in 1882.

According to the International Energy Agency, the share of CHP in power production is more than 50 per cent in Denmark, compared to 5 per cent in India. In Denmark it is used for heating purposes, while in India its used mainly for cooling. Poonacha said fluctuating CNG prices and high initial cost are two reasons this technology has not caught on India. ■



The 1,500-tonne air-conditioning unit at DLF Place

Turn on the tap

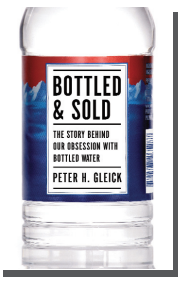
Why do Americans buy expensive bottled water when they have high quality tap water? That's been an abiding enquiry for PETER GLEICK. *Scientist, economist, environmentalist and co-founder of Pacific Institute, an environmental think-tank in Oakland, California, Gleick answered* BHARAT LAL SETH'S *questions over e-mail*

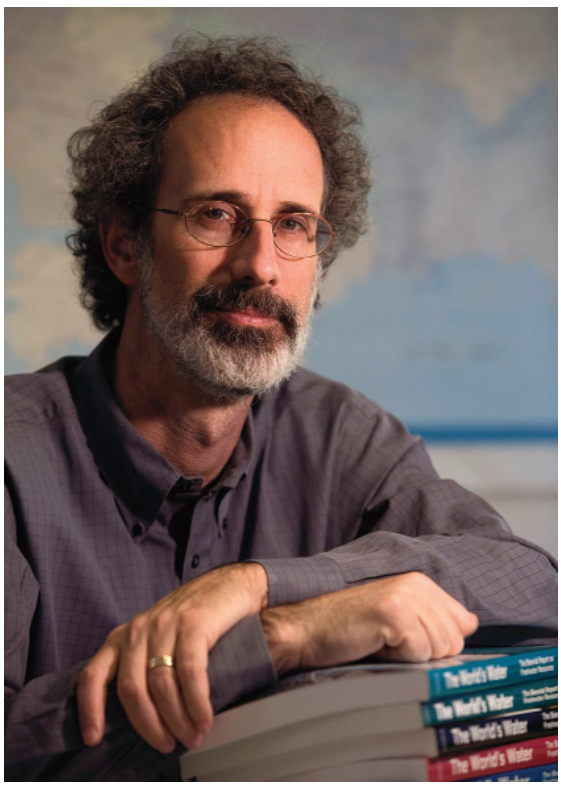
On the bottled water revolution

Bottled water consumption in the US, and worldwide, has been growing rapidly for two decades. It really began when bottlers started using plastic bottles. In my book, *Bottled and Sold: The Story Behind Our Obsession with Bottled Water,* I argue there are four major reasons people are moving to bottled water. The first is growing concern about the quality of tap water; people are increasingly fearful of tap water and believe bottled water should be better. The second is taste: some people do not like the taste of their tap water. The third is convenience: the industry has made it easy to find bottled water everywhere, while water fountains in public spaces are disappearing. And the fourth reason is intensive marketing and advertising to convince people if they buy bottled water they will be sexier, healthier, skinnier or more fashionable.

On whether fear of the tap is justified

There is no doubt the quality of US tap water remains excellent, but there are occasional problems. We must work harder to protect and expand US municipal water systems. Regulations must be tightened and better enforced, and investment in new technology, replacing old distribution systems, must increase. But the occasional problems with tap water do not justify either abandoning our tap water system or moving to bottled water. That would be a disaster, inequitable, and completely inappropriate in a country with such a wonderful municipal water system.





I support taxing bottled water to pay for the additional environmental and social costs of waste disposal

On municipalities promoting tap water

There is a growing campaign on the part of cities, restaurants, advocacy groups, local communities, and scientists to better educate the public on the problems with bottled water. Sales of bottled water are beginning to decline for the first time in decades, in part, I believe, because we are beginning to address the problems of bottled water publicly.

On banning bottled water

I do not support outright bans on bottled water, but I do support municipalities choosing to spend their money elsewhere and to serve local tap water. I also support taxing bottled water to pay for the additional environmental and social costs of waste disposal. To reduce demand, tackle the reasons people buy bottled water. Support state-of-the-art tap-water systems. Protect consumers from fraud and misrepresentations. Ensure truthful labelling on bottles and develop, pass, and enforce smarter water regulations.

On inadequacies in testing bottled water

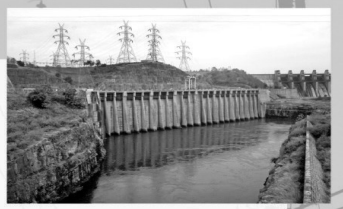
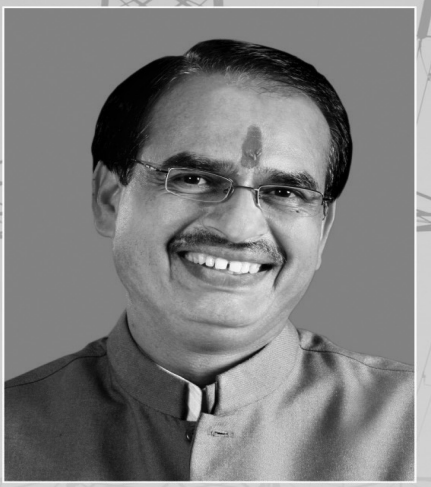
The US Environmental Protection Agency regulates tap water; the US Food and Drug Administration regulates bottled water. There are many loopholes in bottled water regulation that make it less effective than the regulation of tap water. Not all bottled water is under federal regulation—like when it is completely packaged and sold within a state. The rules for testing for viruses and bacteria are weaker for bottled water. The inspections are less frequent, and rarely truly independent.

On the Indian market growing by leaps and bounds

Invest in local municipal water system. It is not enough just to let the rich and middle class buy bottled water, while the poor suffer from poor water quality, irregular service and access, and the consequences of dirty water. Regulate bottled water. Insist on comprehensive recycling laws. Protect local groundwater from overpumping. All of these must be done to minimize the use and bad consequences of bottled water. ■

विकास की राहों में आगे बढ़ते, भविष्य अपना गढ़ते

प्रदेश ने विकास की राहों पर अपनी गति बढ़ाई है।
बुनियादी अधोसंरचना निर्माण के काम में यह रफ्तार प्रदेश के इतिहास में एक कीर्तिमान है।



पिछले तीन सालों में -

- मध्यप्रदेश में 32942 किलोमीटर लंबाई की सड़कें बनाईं।
- स्टेट रोड इंप्रूवमेंट प्रोग्राम में 544.02 करोड़ रुपयों से 6485 किमी सड़कों का नवीनीकरण हुआ।
- 1379.40 किमी मुख्य जिला मार्ग राज्य मार्ग घोषित हुए।
- ओंकारेश्वर जल विद्युत परियोजना, संजय गांधी ताप विद्युत गृह विस्तार, अमरकंटक ताप विद्युत गृह विस्तार और इंदिरा सागर बाईं नहर इकाई से कुल 1235 मेगावॉट उत्पादन क्षमता में वृद्धि हुई।
- निजी क्षेत्र की परियोजनाओं के लिए 45 कंपनियों से लगभग 58700 मेगावॉट के समझौते।
- पारेषण हानि का प्रतिशत 8 से घट कर 4.09% हुआ। ग्रामीण क्षेत्र के लिए अलग फीडर लाइंस को स्वीकृति।
- ट्रांसमिशन प्रणाली की क्षमता 2006-07 की 6493 मेगावाट से बढ़कर 8050 मेगावाट हुई।
- जल संसाधन और नर्मदा घाटी योजनाओं से 416.87 हजार हैक्टेयर में अतिरिक्त सिंचाई क्षमता निर्मित।

विधानसभा के विशेष सत्र में
'स्वर्णिम मध्यप्रदेश' बनाने का संकल्प पारित कर,
भविष्य का नक्शा तैयार हुआ है।

अगले तीन वर्षों के संकल्प -

- प्रदेश की विकास दर 9 से 10% तक रखी जाएगी।
- संभागीय मुख्यालयों को 4 लेन और जिला मुख्यालयों को 2 लेन सड़कों से और सभी गांवों को बारहमासी सड़कों से जोड़ा जाएगा।
- चिन्हित राजमार्गों के रख-रखाव के लिए स्टेट हाइवे फंड बनेगा।
- स्थापित सिंचाई क्षमता में 7.50 लाख हैक्टेयर की वृद्धि होगी।
- सिंचाई की स्थापित क्षमता के समुचित उपयोग के लिए कमांड एरिया डेवलपमेंट प्रोग्राम सहित सभी कारगर उपाय होंगे।
- वैज्ञानिक आधारों पर जल के युक्तियुक्त दोहन की योजना बनेगी।
- बिजली आपूर्ति में सुधार के लिए कम से कम 5000 मेगावॉट की वृद्धि होगी।
- सभी तकनीकी और वाणिज्यिक हानियों में 9% की कमी होगी।

आओ बनायें अपना मध्य प्रदेश

मध्यप्रदेश जनसम्पर्क द्वारा जारी

D-69150

In ocean's way

People watch helplessly as the sea nibbles the Konkan coast, swallowing groves and beaches, and shallowing creeks

APARNA PALLAVI *Sindhudurg*

Sadanand Tandel's house is the dream of every tourist. A terrific sea view, waving coconut fronds and in a few dozen steps one can walk into the sea waves. Through Tandel's eyes, however, the view is somber. Till 1991, 30 of his coconut trees stood where the sea is now. The distance between the waves and the walls of his house is narrowing every year—not slowly and surely any longer, but at a terrifying clip.

Tandel's predicament is not very different from that of other residents of villages along the Konkan coast. Studies by a group of scientists from Pune indicate that the sea level along the west coast of Maharashtra has gone up by five-six cm in the past 20 years, making the tide move steadily inwards and the water level in the creeks to rise alarmingly. The reasons, they say, are global warming and disturbance from construction along the sea coast.



A ravaged bund separates the sea from Sadanand Tandel's house in Deobagh village

Sea level on the rise

Shrikant Karlekar, who heads the geography department at SP College in Pune and specializes in coastal geography, has been monitoring geomorphological changes along the Konkan coast from Dahanu, close to Mumbai, to Vengurle in south Sindhudurg for the past 20 years, along with faculty members and students. Their studies reveal the sea level rise has been mostly gradual, with periodic episodes of a sudden rise. The most recent episode was on the full moon night of December 29, 2009, when the high tide rose by 4 cm near Ratnagiri town. "The previous year on the same day the rise was 2 cm," said Karlekar, who has written several papers on the phenomenon. "In recent years the sea level has risen at a much faster pace than in the early years of our study."

The five-six cm rise translates into the salt water intruding up to one kilometre inland, damaging mangroves, eroding beaches and filling creeks with sand and grit from erosion. The impact is more along the flatlands than in areas where the coast is rocky. Sindhudurg district with flatlands is the worst affected, while Raigad and Ratnagiri districts, which have rocky coastlines, have had relatively less impact, Karlekar said.

40 hectares lost in 15 years

Tandel remembers the sea waves first entered his village Deobagh in Malwan tehsil of Sindhudurg during the 1978 monsoon. Since then the village has lost about 32 hectares (ha), mostly valuable coconut groves, to erosion because of two reasons. One, the rising tides and two, the rising level of the Karli creek.



PHOTOGRAPHS: APARNA PALLAVI / CSE



The village is a strip of land extending into the sea, with the creek to its south and the sea to its north and west. Tandel's house now stands on the very tip of the land. He is one of the 70 residents of the village who have lost land to the sea. "In the 1980s the sea was more than 300 metres from my house and some 1,000 *saru* (*Casuarina equisetifolia*) trees were planted to protect the coast between my grove and the sea," he said. Today the sea is 40 m from his house.

In village Tondawali, some 20 km north of Deobagh, the hamlet of Talasheel is reduced to a thin strip, 300 m to 500 m wide and seven km long, between the Kalawal creek and the sea.



High tide floods the chipi *groves along the Elephanta islands*

The sea level along the Maharashtra coast has gone up by five-six cm in the past 20 years

For a 300 m stretch the width is just 100 m. "One strong monsoon tide could wash away this stretch," said former sarpanch Jayhari Kochrekar.

In the past 15 years, the village has lost around 40 ha, inform residents. This includes about 500 coconut trees, *saru* and *nirgudi* (*Vitex negundo*) plantations and space for drying fish. Lakshmi Kochrekar had to rebuild her house twice in five years because of the rising level of the creek. "I have no more land to move to now," said she. Many residents are finding the monsoon tide reaching their homes.

Moving up along the coast, in the Deogad port city, fishers and fish driers say the sea has been swallowing land used for beaching boats and drying fish for over a decade. "It has swallowed more than 25 m up to the hill, which separates the port from the town," said fisherman Milind Borkar.

Erosion by the rising tide has turned the Deogad cove shallow, hitting small fishermen. "We do not have big boats that can go into the open sea," said Mohan Keluskar. "And hardly any fish is left in the cove." Village Wadatar along the Deogad creek has lost its paddy land and groves of Alphonso mangoes, said elderly resident Shridhar Wadekar.

Villages, like Achra and Tarkarli in Malwan, with rocky coastlines have not felt the impact of the rising sea level yet, but villagers report slow submergence of distant rocks in the sea. According to the state Harbour Engineering Department, 45 km of the 120 km Sindhudurg coastline is prone to erosion.

Sea does not return land anymore

Village elders say the very behaviour of the sea is changing. Patterns of erosion and deposition, and tides are not the same. While tides are eroding more rapidly, deposition of the eroded material is not happening like before. "We have a saying that the sea brings back whatever it takes," said Wadekar. "But for the past two decades I have been waiting for it to bring back my rice farm."

Elderly citizens at Talasheel agree. Matriarch Sunanda Kochrekar said erosion by the sea has long been accepted as inevitable. "During the monsoon every year the tide would erode part of the beach," she said. "But after Diwali deposition would restore the coastline to more or less the same position." For two decades the deposition is not happening.

Vaishali Sawant of Deobagh even has a measurement for the sea's erosion pattern. "It was said in our childhood that every year the sea advances by the length of one bamboo stick during the monsoon and recedes after Diwali," she said. But in recent years the sea has only been advancing with no signs of receding, she added, looking at the lapping waves barely 30 m from her backdoor.

The pattern of tides has also become irregular, residents have noticed. Jaihari Kochrekar and others in Talasheel say the tidal cycle, which was earlier guided strictly by the course of the moon, is not following the rules any longer. "Earlier, we had high tides at full and new moon,

Tides batter Elephanta

Initially, residents of the Elephanta island near Mumbai were not bothered by erosion of paddy fields by sea waves. They had a secure income from tourism. But now the tides are closing in, destroying roads and trees. In the past three-four years, many residents complain, the tide is coming dangerously close to their houses. "It now comes 10 to 50 m inland," said Rajendra Padte, deputy sarpanch of Dharapuri panchayat. The biggest trouble, said Padte, is washed away roads. People have to walk over jagged and dangerous rocks littered with garbage from the sea and the stench from dead sea animals is unbearable, he added.

People say unusually high tides began in the 1980s with the building of the Nava Sheva port at Uran in Raigad district, 40 km from the island, by the Jawaharlal Nehru Port Trust. "Many rocks were dumped into the sea, disturbing the tides," said Padte. "Now the tides are hitting the eastern side of the island hard."

"We've been campaigning for a protective wall since the 1980s," said Narendra Bhoir who sells craft items near the famed caves on the island. The wall was sanctioned in 2007-08 for half the island. It is ready but the remaining half is unprotected. Padte, a contractor with the Jawaharlal Nehru Port Trust, said the trust has enough money to build a wall for the other half.



Work on a fishing harbour at Deogad was stalled because it caused high tides

but nowadays we have sudden very high tides in the middle of the fortnight as well," said Jaihari.

In Achra, elderly resident Arun Sarang said the daily tidal cycle is also changing. "In my youth about 30 years ago, we used to set our watches by the noon high tide, which would come at 12 sharp. But nowadays the noon tide timings are changing from day to day by 20 minutes to an hour," he said.

Karlekar, whose studies have relied heavily on people's observations, said such observations are crucial but rued that no proper tidal pattern data is available to verify them. "In the West people are involved closely in monitoring tidal patterns with tidal gauges and measuring rods installed along coasts, resulting in an excellent data base," he said. "On the Maharashtra coast, however, despite the fact that tidal gauges are installed, the Harbour Engineering Department neither maintains proper data of its own nor involves people in its collection and analysis."

Global warming or local activity?

Karlekar said global warming cannot be ruled out as a reason behind the change in sea level because the scale is too large to be attributed to local reasons alone. People in the coastal region say ever since the Coastal Management Regulatory Board was set up over 10 years ago more ports and jetties have been built, bridges constructed across creeks and the ambitious coastal highway project has been launched.

In Talasheel, the water level rise in the creek at high tide has increased in the past few months since the construction of a jetty began downstream. "The jetty is blocking half the width of the creek, so that the water that enters it at high tide does not recede fast enough," said Raghunath Tandel, whose backyard is fast becoming part of the creek. At Deogad work on a fishing harbour, which involved filling up nearly half the Deogad cove, was stalled months after it began. The residents of Anandwadi, a fishing hamlet on the other side of the cove, got a court to stay the work. "As soon as they started filling the cove the tide at our end started rising alarmingly, reaching houses," said Dinesh Posam.



Rise in sea level is affecting the flatlands more than the areas with rocky coast

— Shrikant Karlekar,

Head of geography dept, SP College, Pune

While people see siltation from construction as a serious problem, they do not oppose construction, especially of roads and bridges, because it implies better income and easy commuting.

Official apathy, deceptive solutions

The people demand two measures: desiltation of the creeks and construction of bunds along the sea coast to hold the tide back. Common complaints are that the officials have ignored desiltation and bunds are of poor quality.

At Talasheel, which receives evacuation notices from the district collector every year in May, people complain they have not been given any land for relocating and that the bunds are being constructed very slowly and in wrong places. In Deobagh, a section of bund built by the Harbour Engineering Department in 2009, after nearly 15 years of chasing officials, came undone the same year during the monsoon. The crumbling stone bund is all that stands between the sea and Tandel's house.

No government agency has studied the causes of the rising sea level and the extent or intensity of the problem. The response of the civic and government authorities has been to ignore the problem for as long as possible and then build expensive bunds—costing Rs 60,000 per metre—in bits and pieces. Till date, about 10 km of anti-erosion bunds have been constructed in Sindhudurg, said the Harbour Engineering Department.

Officials rarely react unless the situation is serious. Malwan tehsildar Vinod Khirolkar said rising tides are affecting only Deobagh and Talasheel, ignoring that Bhogve, Rewandi, Dandi, Tondawali, Sarjekot and other villages have also reported small amounts of land loss in recent years. Deogadh tehsildar Chandrakant Mohite asked *Down To Earth* if there were reports of such problems in his tehsil since he had not heard of any.

Karlekar said bunds and desiltation, both expensive options, are at best short-term solutions. "Bunds are being breached every year. They are at the most four metres high, and could be rendered useless in two or three years," he pointed out. "Desiltation is important but unless construction work is checked more silt will accumulate in a very short time."

What is needed, said Karlekar, is a comprehensive and large-scale study, assessing the rate of sea level rise along the Maharashtra coast. "What's more, areas with rocky coastline need to be included in such a study before problems start arising there," he said. Any long-term solution must address the causes of the destruction, rather than just remedial measures like the bund that gave only false sense of security to Tandel for a brief period. ■



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The battle for knowledge

What are patents? Why have they become politically contentious and a major source of friction between rich nations and the developing world?

LATHA JISHNU

If tariffs were the big-ticket issue of trade disputes in an earlier decade, intellectual property rights (IPRs) are making for all the drama, stand-offs and skulduggery in international negotiations today. Why are IPRs so crucial to the new economic order? To understand this one needs to come to terms with the idea of knowledge as property—a western concept of individual entitlements that was given a systematic framework of legal protection as IPRs in the 19th century.

The globalisation of IPRs was achieved through the incorporation of TRIPS (trade-related aspects of intellectual property rights) as one of the core agreements of the World Trade Organization (WTO) in January 1995. It tilted the scales even more in favour of developed countries by burdening poor nations with additional costs.

WHAT ARE IPRs?

IPRs are legal entitlements that allow its holders to exercise exclusive rights in varying degrees and periods. Patents, copyrights, trademarks and trade secrets are common forms of IPR.

Patent rights are granted nationally for inventions that are novel and useful. These can be devices, substances, methods or processes. Anything that relies on natural phenomena, abstract ideas or the laws of nature does not qualify. Patents are usually granted for 20 years from the date of application and are effective only in the country in which the application is filed. The EU, though, recently initiated moves for a unified patent across the 27-nation trade bloc.

Copyright is legal protection for original creative work in the literary field, performing arts, broadcast, multimedia and software. Copyright is valid for the lifetime of the author plus 60 to 70 years as the case may be in different countries.

WHY ARE PATENTS AN EMOTIVE AND POLITICALLY DIVISIVE ISSUE?

Those who champion IPRs, mainly the rich nations, say they are an incentive for innovation and offer a means to finance research and development. Activists and governments in developing world say it is unfair because they cannot compete at the same level. To protect their interests, industrialised nations are blocking access to knowledge and resources that are vital to helping the poor nations develop.

HOW DO IPRs IMPACT THE POOR?

Patents affect access to essential medicines by facilitating the high cost of branded drugs and blocking the entry of low-cost generic equivalents. It also has consequences for a country's food security. For example, the hold of a few multinationals on seed patents increases the costs of agricultural produce. Efforts are under way by the Organisation for Economic Cooperation and Development (OECD) countries, the grouping of the rich, to stop farmers across the world from their centuries-old traditions of brown-bagging, exchanging or selling their seeds to one another. One of the instruments being employed for this purpose is UPOV or the International Union for the Protection of New Varieties of Plants in Geneva. The objective of the convention is to promote IPRs on new plant varieties. India is under pressure to join UPOV because its *sui generis* system gives precedence to farmers' rights over breeders' rights.



DIVYA

WHERE ARE IPR BATTLES FOUGHT?

While initially the IPR arena was WTO, new battlefronts are opening up as OECD steps up its campaign for higher standards of IPR protection. One such attempt is being made at the World Intellectual Property Organization (WIPO), a UN body, where the US, the EU and Japan are seeking to harmonise national patent laws to achieve TRIPS plus standards. Free trade agreements between rich nations and developing countries are increasingly being used to push through TRIPS plus standards in a variety of ways that will affect public health policies of the developing countries.

WHAT THREATS DOES INDIA FACE?

India's generic drugs have become a target of a nasty EU campaign under the guise of cracking down on counterfeits. EU customs, at the behest of pharma MNCs, are seizing consignments of Indian drugs exported to third world countries, although these are genuine medicines and the manufacturers have not broken patent rules. A complaint is pending in WTO. Of even more concern is a high-pressure campaign by drug MNCs to get India to revoke Section 3d of its patent law that excludes minor changes to a drug formulation from being patented afresh.

WHAT TO WATCH OUT FOR

Attempts by some rich nations to step up patent enforcement measures, such as the Anti-Counterfeiting Trade Agreement, which will force developing nations to change their laws to accord higher IP protection for a range of goods and services. India requires to be on high alert to ward of IPR threats that will impact development. ■

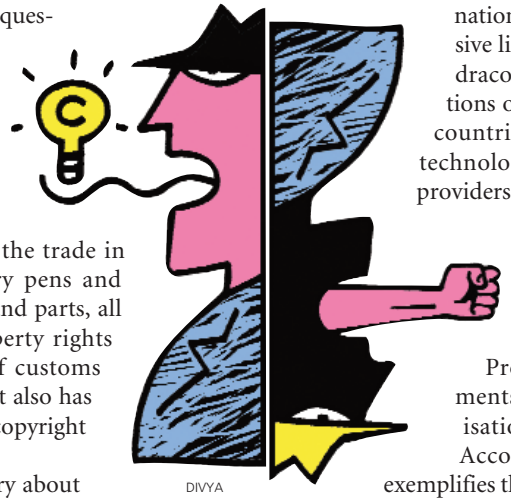
PATENTLY ABSURD / LATHA JISHNU

THE IRRELEVANCE OF MULTILATERALISM

Rich countries gang up for a more strident intellectual property rights regime

WHAT RICH COUNTRIES SAY AND WHAT THEY ACTUALLY DO is worlds apart. At the just concluded round of discussions on ACTA, the controversial Anti-Counterfeiting Trade Agreement, in Lucerne in Switzerland, the countries trying to steamroller a plurilateral pact to tighten enforcement of global intellectual property (IP) rules made some rather incongruous promises. The agreement, they affirmed, would "respect fundamental rights and liberties" and it would be "consistent with World Trade Organization agreements".

There is supreme irony in this. If these countries—the cabal of 11 is led by the US, the European Union (EU), Japan and Switzerland—swear by the multilateral WTO framework why then are they furtively pursuing an enforcement agenda outside its ambit? This is the question that's troubling countries like India, China and Brazil, which have been kept out of the secretive ACTA negotiations that began in 2007. It was not till a draft was leaked in March this year that the protests became sharp and rose in volume.



DIVYA

ACTA is aimed at stamping out the trade in fake products ranging from luxury pens and watches to automobile accessories and parts, all of which infringe intellectual property rights (IPRs), by strengthening powers of customs officials to seize counterfeit goods. It also has draconian measures to fight online copyright violations.

India, for one, is particularly wary about what ACTA might do to the flexibilities available in the WTO's Trade-Related Aspects of Intellectual Property Rights (TRIPS), which allow a fine balance of interests. India has had bitter experience of the EU's attempts to undermine these rules when its generic drugs industry became the victim of border measures. Starting in 2008, some EU member-states began seizing legitimate cargoes of generic drugs manufactured in India and destined for African and Latin American markets on specious grounds and in clear violation of WTO rules.

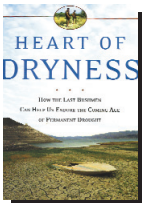
So when the Lucerne meeting issued a communiqué last week claiming that ACTA would certainly "not hinder the cross-border transit of legitimate generic medicine" there were few takers. Voluntary organizations, highly sceptical of such promises, fear that the IP enforcement agenda being pursued by these countries would result in restricted access to medicines. The result would be higher healthcare costs in countries dependent on imported drugs, specially low-cost generics from India. As in the case of EU seizures, Indian officials worry that ACTA border measures would target genuine generic drugs, which are quite often subject to patent disputes in the guise of weeding out counterfeits.

Academics and legal experts are equally wary about the reassuring noises coming from the ACTA camp, which includes South Korea, Australia, Canada, New Zealand and Singapore. An international group of 90 academics, lawyers and activists, who gathered in Washington prior to the Lucerne round, warns that ACTA is not only inconsistent with the TRIPS agreement, but will lead to increased border searches. And access to medicines is not the only concern; there is the issue of Internet access, too. This is the first time enforcement in the digital arena is being dealt with on the international level. But what is envisaged are massive liabilities and criminal penalties under a draconian regime that places severe restrictions on online freedom—all by a handful of countries who have not even consulted the technology companies and telecom service providers who will have to police the networks.

Is this a sign that multilateralism as embodied by the WTO matters no longer? ACTA is the first IPR-related pact to be negotiated outside the WTO and WIPO (World Intellectual Property Organization) and the statements made by the heads of these organisations indicate the lie of the land. According to WIPO's Francis Gurry, ACTA exemplifies the inability of the multilateral system to provide swift answers to international problems. This inability was forcing member-states to take matters into their own hands much to the detriment of the inclusive nature of the system.

As for WTO chief Pascal Lamy, he shrugged off the issue. Asked by European parliamentarians to provide an "expert assessment of the current provisions of ACTA", Lamy said the secretariat could not do so on its own. However, the enforcement of IPRs beyond the agreed level set out in the WTO Agreement "in itself is not precluded by TRIPS, which allows members to establish more extensive levels of protection provided they do not contravene the TRIPS Agreement". So where does this leave the bulk of WTO members who are excluded from ACTA negotiations?

The answer may lie partly in what the Indian delegation told the TRIPS Council: that the ACTA agenda "shows a general shift in the locus of enforcement which enhances the power of IPR holders beyond reasonable measure". ■



BOOK>> HEART OF DRYNESS • *by James Workman, Walker and Company* • US $25

Water doctors

JENIFFER SAVEDRA

"We don't govern water. Water governs us," writes James G Workman. In 2002, Workman, who was previously a speechwriter for the Clinton administration and worked on the groundbreaking report of the World Commission on Dams, set off for the Kalahari Desert in search of a coping strategy for water scarcity. The secret to quenching the world's thirst, according to him, lay in the hands of an ancient people, the Bushmen.

Workman cleverly and humorously places himself as the "Dudley do-right" American who sets out to help the Bushmen by smuggling water into their camp in exchange for information about their way of life.

Caught in a conflict between Botswana attempting to push the "uncivilized" desert people out of the desert and the desert people not wanting to leave, Workman weaves a narrative—compellingly heavy on facts and history—that reveals water as a weapon. On the one hand, you have the Botswana government, who under the guise of wanting to "free" the Bushmen from having to "chase after water", declares war on them by blocking their access to water in the Kalahari. On the other hand, the Bushmen, refusing to submit to the force of Botswana President Festus Mogae, use their age-old knowledge and desert skills to squeeze water from, as the title states, the heart of dryness.

For instance, Workman writes that the Bushmen learned to adapt to a dry environment by practising dry sanitation, dry hygiene and dry health. They would clean cookware, knives, utensils, and pots by scouring out the interior with sand, and would also scrub babies and children."

Moreover, Workman says, "Many times we think, 'oh, the poor Bushmen they are living hand-to-mouth, they are living day to day,' but they are freer than you and I because they aren't subject to a monopoly. They don't depend on one entity who they don't know, and who you and I don't know, to supply them with what it takes to survive."

The author is the omniscient narrator and predicts an inescapable and impending drought—an urgency that works well for the plot, but pragmatically seems a bit too apocalyptic. "I define drought differently, more like a layperson. A climatologist may say, 'Oh, drought is when there is this much water.' For me, it's when there is more demand, more thirst for water, than there is supply. And we are definitely heading towards that." says Workman.

So what's the secret of dealing with water scarcity? According to Workman, taking ownership of water at an individual level is the Bushmen's secret to surviving permanent drought. He says as long as there exists a centralized control of water "we are going to be in more and more trouble because we are going to be fighting each other, either through the government or against the government or outside of the government, to try to get what is rightfully ours." ■

Jeniffer Savedra is a web editor at the Centre for Science and Environment

Kalahari sip-wells: Bushmen's drought insurance



FROM THE BLURBS

HEADCOUNT: MEMOIRS OF A DEMOGRAPHER, *by Ashish Bose, Penguin, Rs 450*

The acronym 'BIMARU' was widely used in the mid-1980s to refer to the population issues of India's four largest states—Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh. Ashish Bose, who coined the term, is the pioneer of demographic studies in the country. In *Headcount*, the demographer sets the record straight on BIMARU, and in the process, presents his view of modern India. He paints a vivid portrait of a life well-lived—from his childhood in Kolhapur to his encounters with three generations of the Nehru-Gandhi family and his memories of the Emergency.

ECONOMICS OF RIVER FLOWS: LESSON FROM DAM REMOVALS IN AMERICA, *by Bharat Jhunjhunwala, Kalpaz Publications, Rs 750*

Hydropower dams are being removed from the US, while in India policy experts wax eloquent about them. Calculations in the US show that hydropower is costly if costs of loss of fishing, recreation and biodiversity are taken into account. This book argues for drawing a lesson from the US experience.

TAKING SOCIAL DEVELOPMENT SERIOUSLY, THE EXPERIENCE OF SRI LANKA, *by Laksiri Jayasurya, Sage, Rs 595*

The author identifies three distinct phases of development of social policy in Sri Lanka—that of the early, late and post colonial state. He shows how Sri Lankan social development has since been reframed by a combination of neo-liberalism and a protracted civil war.



BOOK>> THE FACEBOOK EFFECT • *by David Kirkpatrick, Simon and Schuster* • Indian Price Rs 450

World peace, virtually

ANANTH NAYAK



SOURCE: WORDPRESS.COM

In recent times, the social networking site, Facebook, has been dogged by allegations of privacy violations. David Kirkpatrick's *The Facebook Effect* does not take issues with these accusations. It is at its best in describing the genesis of the site. For most part the book is a celebratory account.

In 2004, Mark Zuckerberg, a Harvard student who had acquired infamy at the university for a sexually tinged website, partnered a wealthy classmate to launch his university-based social network. He collaborated and then reneged on other Harvard students working on their own social sites, withstood costly litigation and moved into the world of big-time finance as practised by Silicon Valley's venture-capital community.

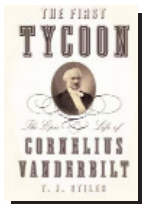
According to Kirkpatrick, the Silicon valley capitalists were quick to grasp the marketing possibilities of a site acting as the repository for so much personal data.

Kirkpatrick's portrayal of this phase of Facebook is far more sympathetic, and rings far truer, than the elusive figure in the hooded sweatshirt who dominates Ben Mezrich's *The Accidental Billionaires*. In one of the book's most compelling sections Zuckerberg excused himself from a dinner hosted by Accel Partners' Jim Breyer to discuss a lucrative investment. A friend found him on the floor of the men's room, in tears because accepting the deal would mean backing out of an earlier commitment.

But for Kirkpatrick Facebook isn't just a social networking site or a potentially huge business. He thinks it could be an agency for world peace. In the prologue he ponders: "Could (Facebook) become a factor in helping bring together a world filled with political and religious strife ...?"

Social networking, it is true, is in vogue with political and climate change activists. Facebook is also in vogue with another kind of activists: those concerned with how the social networking site violates individual freedom. There is also talk of an open source social networking site. This, in itself, is testimony to social networking's popularity and could have been material for Kirkpatrick. But it's still uncomfortable terrain for someone writing a laudatory account. ■

Ananth Nayak works for a software outfit in Hyderabad



BOOK>> THE FIRST TYCOON: THE EPIC LIFE OF CORNELIUS VANDERBILT, • *By T J Stiles, Knopf* • Rs 800

Stuff of a capitalist

ROHAN SENGUPTA

American capitalism often arouses extreme emotions. It's loathed as an arrogant system standing in the way of an equitable world order. It's also lauded as an agent of liberalism and democracy. Capitalists who had very little idea about big business laid the foundations of this great economy; they engaged in street brawls, had little idea of fair play, but did not know where the adventure would lead them.

When a man named Cornelius Vanderbilt started his career as a steamship sailor in the early 19th century, the word "tycoon" didn't exist. But in a few decades he controlled the way Americans moved. From steamboats to railroads, most American modes of transport in mid-19th century were part of the Vanderbilt empire.

T J Stiles' biography of the US' pioneering industrialist is worthy of its subject. It shows Vanderbilt as a cocky teenager taking on aristocrats of the Manhattan docks. Vanderbilt's fast and cheap boats supported a textile revolution in New England. During the Gold Rush Vanderbilt would often personally steer steamships through the Nicaraguan rapids.



Cornelius Vanderbilt's statue in Manhattan

Later, his campaign moved to railways. He decried monopolies when it suited him but embraced them when it enriched him. Stiles ferrets out Vanderbilt's letters; one is a correspondence with Mark Twain. The author had lampooned him for mowing down pedestrians in fine horse-drawn carriage. Vanderbilt retorted, "You are the idol of a crawling swarm of small souls." Twain, as Stiles puts it, saw Vanderbilt as a false idol in "a culture grown vulgar, selfish, materialistic and corrupt." ■

Rohan Sengupta is a journalist in New York

INTERNET>> LEGAL RIGHTS • Finland

Right to byte

July 1, 2010 is very likely to be a landmark date in Internet history. On that day Finland became the first country to make broadband a legal right for every citizen. Every Finn will have the right to access to a 1Mbps (megabit per second) broadband connection. The country's government has promised linking all to a 100Mbps connection by 2015.

The new law means telecommunications companies will be obliged to provide residents Internet connectivity of 1Mbps. Finland's communication minister Suvi Linden told BBC, "Finland has worked hard to develop an information society and a couple of years ago we realized not everyone had access."

According to unofficial estimates 96 per cent of Finland's adult population have a net connection.

Making broadband a right could have implications for countries that plan action on illegal file-sharing. The UK and France have said they may cut off or limit the Internet connections of people who persistently download free.

But the Finnish government has adopted a gentler approach. "We will have a policy where operators will send letters to illegal file-sharers," Linden said. ■



ILLUSTRATIONS: DIVYA

FILM>> CIVIL WAR • Congo

Solitary warrior

"One person alone cannot push an elephant, but many together can," Rose Mapendo tells Congolese women. She is the lead character in the documentary *Pushing the Elephant,* which premiered in New York as part of the Human Rights Watch International Film Festival in June.

Mapendo's husband was killed in the Congo violence in the late 1990s. She lived in death camps with nine children, including a pair of twins born in the camp. When filmmakers Beth Davenport and Elizabeth Mandel heard Mapendo's story, she had moved to the US and become an outspoken activist for peace in the Congo.

Davenport and Mandel, who have earlier worked on eight social issue documentaries, captured intimate scenes of family life, high school, and Mapendo's activism over two and a half years of filming. ■



Rose Mapendo survived death camps

RADIO>> GENDER EQUALITY • Iraq

Where young speak up

In her late teens, Huda is beautiful and smart, a combination many parents hope to see in their children. "Having a diploma," said the young woman from northern Iraq, "is the same as having a weapon." Huda was speaking at a radio programme, *Shabab al-Nahrein.* Launched by the international news agency, Radio Free Europe, the programme takes on taboo topics in Iraqi society, particularly those among the country's younger generation.

Huda's family stopped her from attending school when she was 13 years old. "What am I doing? Just cooking and cleaning the house. What am I contributing (to society)?" she asked.

One father interviewed on the programme said, "If my daughter goes to university, she will become very stubborn. Her husband won't like this, and eventually he will divorce her." ■

SNIPPETS NEWS

>> Indigenous artists are a strong presence on the Australian and international art scenes, but their voices are almost silent when it comes to leadership roles in many of the country's public and private galleries. In a bold bid to inject change from the top, the National Gallery of Australia has launched a five-year plan to boost the number of Indigenous people in arts administration jobs.

>> The US authorities have removed nine websites, accusing them of movie piracy. The websites offered free access to recent movies such as *Toy Story 3*. Kevin Suh, vice-president of content protection for the Motion Picture Association of America, called the move the largest crackdown on illegal movie and television websites in a single action by the federal government.

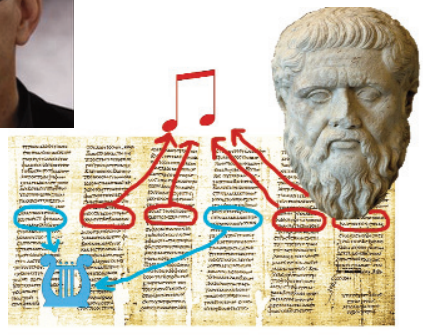


MUSIC>> MATHEMATICS • UK

12-note math

A historian claims to have cracked a mathematical musical code in the works of Plato. Jay Kennedy of Manchester University said it was "like opening a tomb". The historian of science found many of Plato's dialogues had line lengths based on multiples of 1,200. Kennedy says this pattern corresponds to the 12-note musical scale used by Pythagoreans. He divided the texts into equal 12ths and found that "significant concepts and narrative turns" are at the junctures. Andrew Barker, an authority on ancient Greek music, said it also explains why Aristotle claimed Plato was a follower of Pythagoras, to the bafflement of most scholars. ■





Jay Kennedy divided Plato's texts into equal 12ths. At junctures were concepts, narrative turns

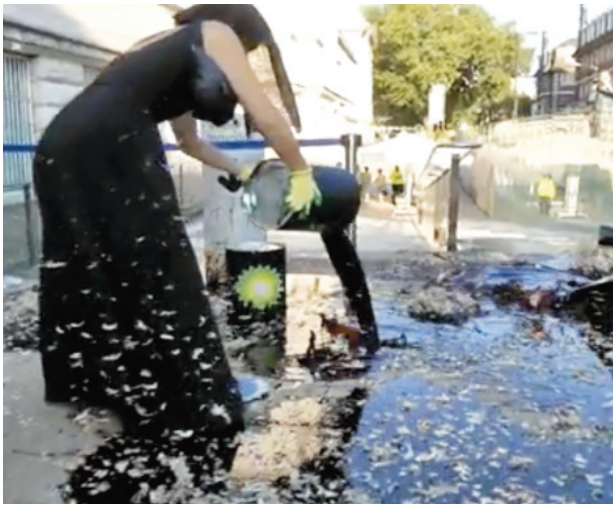
THEATRE>> SOCIAL PROBLEMS • Brazil

Who is a hero?

Five youngsters wearing masks and capes burst into a busy plaza in the Brazilian city of Rio de Janeiro. Part of Everyday Heroes collective, they are investigating what it means to be an everyday hero, said Tania Alice, head of the theatre school at the Federal University of the State of Rio de Janeiro.

The youngsters ask passersby, "Who is a hero?" "Someone who helps the needy," one woman answers. "Who are the villains?" "Corrupt politicians, obviously," is the confident reply of another person taking lunch break in the plaza.

Gilson Motta of the collective explained that the idea is to raise questions so that people themselves will seek, identify and overcome social problems. ■



MUSEUM>> OIL • London

Oil on Tate's face

It was a summer party celebrating BP's 20-year sponsorship of London's Tate Museum, and protestors used it to call attention to its handling of the oil spill in the Gulf of Mexico.

On June 28, protesters emptied BP-labelled cans containing a slick material in front of the party's entrance and covered the spillage with bird feathers. Other protesters poured cans of the same material in the museum's main hall, while a separate group dressed in black picketed the event.

BP, which spends more than US $1.5 million a year to sponsor art institutions, including the Tate Britain, the British Museum, the Royal Opera House and the National Portrait Gallery, said it would continue the sponsorships.

"We are grateful to BP for its long-term commitment," said the galleries in a joint statement. ■

ONLINE

www.plasticless.com

ABOUT BAD POLYMERS



THE creator of this site thinks that the recent question marks on the Teflon frying pan are an opportunity to find a plasticless alternative. Martin Higgins from Malta is a fan of cast iron cookware. Steel fabrication, he says, also has an environmental cost, but buying one steel frying pan for a lifetime is greener than buying a new Teflon pan every year or two.

www.plasticless.com has a collection of articles that deals with pots and pans to packaging items. There is also an endearing piece on the good old cardboard box. And if you see how plastics harm our oceans click on some of the links at the site.

Then there is also a sardonic little piece on how combat helmets could be put to use as cyclists' headgear. Log on to the site and it is quite likely you won't see the ubiquitous plastic in the same light.

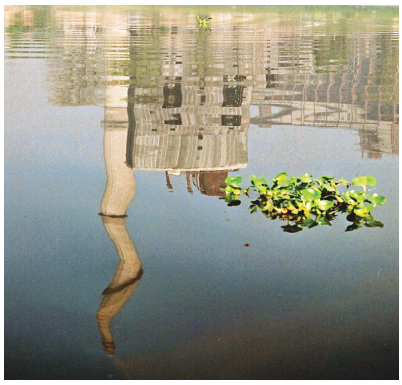
DOUBLE STANDARDS AND TRANSPARENCY

AWAY from the conference rooms of climate talks, developed countries have begun arm-twisting developing countries to reduce their dependence on fossil fuels. Sasan, a coal-based project of Reliance Power, almost lost out on funding from a US-based lending agency (see p20). Earlier in the year, power plants in South Africa and Pakistan faced similar opposition. While climate negotiations are going through a dark alley, civil society and governments of the North toy with the development goals of their poorer cousins.

Emissions from coal-powered plants, its true, are a major cause of global warming. Replacing coal, however, is a tough proposition. Renewable power is cleaner, but unreliable and in the current market costlier. Nuclear power comes with its own drawbacks, including waste disposal and radiation fears. For developing countries, especially India, where more than half its population gets little or no electricity, coal appears to be the only short-term answer. More so because rich countries have not fulfilled the obligation to fund and transfer new and cleaner technologies. At the same time they pursue a growth trajectory that relies on coal. US alone will establish 60 coal-fired power plants in coming years.

Coal will steam India into the next decade as well; more than 100 power plants are in various stages of planning.

Coal-powered plants are a contentious issue even at home. Jindal Power Limited's plant in Raigarh (see p9) and GMR Power's proposed plant in Raipur (see p16) have been pulled up by the environment ministry for starting construction before getting environmental clearances. Another power plant owned by Jindal in Ratnagiri is facing opposition from people in the area.



Local conditions need to be respected before setting up these plants and mitigation measures adopted before clearances. The Ratnagiri plant will affect cultivation of the prized alphonso mangoes unless pollution is arrested. Raipur and Raigarh are already brimming with industrial activity. Pollution there has passed tolerance levels. These are not the best locations to set such units. While industry works for profit, the government needs to tread a cautious path, lest the indirect costs of using coal overtakes its so-called development benefits.

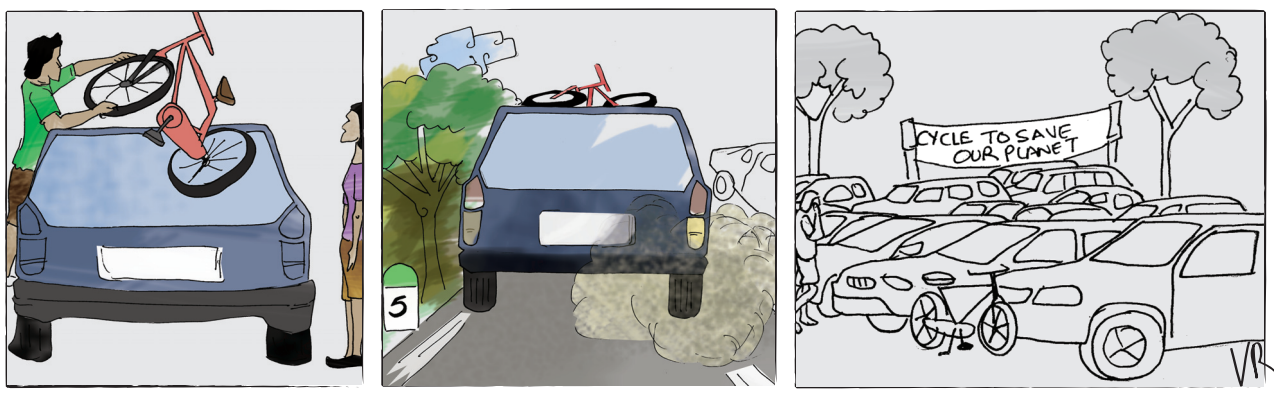
Expert sharing

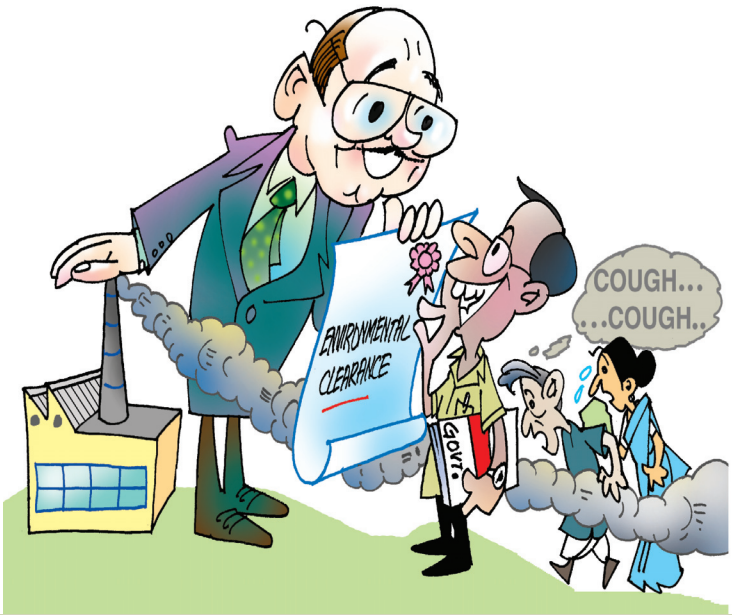
Criticism in hindsight is not always fair. But it does not hold true for a lot of recent criticism of the World Health Organization (WHO). It has been involved in far too many controversies to deserve benefit of doubt. The speed with which WHO labelled swine flu pandemic last year was surprising. Swine flu symptoms are similar to that of common flu and sure there was no scarcity of victims. But now media reports say health experts who advised WHO on the H1N1 outbreak had close connections with the pharma industry. This sharing of experts between private and public bodies might have led to an unnecessary scare, leading to wastage of public money. Most drugs and vaccines procured to contain H1N1 outbreak lie unused. WHO denies it shares experts with the pharma industry. But the H1N1 episode is not a one-off case.

Pneumonia cases in India are not well documented, but the Union health ministry and WHO are pushing a pentavalent vaccine against pneumonia. Although there are question marks on the vaccine, the global health watchdog has changed the definitions in its testing protocols to give the vaccine a clean chit (see p14). WHO also promotes ready-to-use food for malnutrition and the patent holder of the most widely used therapeutic food, Plumpy'nut, is one of its consultants.

WHO, it seems, could do with a bit of transparency. ■

THE OCCASIONAL RIM





CSE's short-term EIA training programme

UNDERSTANDING EIA: FROM SCREENING TO DECISION MAKING

COURSE FEES
Rs 9,900
(For industry, environment consultants and regulators) 50% discounts for NGOs, Academicians and students

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TIMING
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COURSE VENUE
CSE, 41, Tughlakabad Institutional Area, New Delhi – 62

LAST DATE FOR APPLYING
July 29, 2010

OPEN FOR ALL
NGOs, Regulatory Institutions (such as SPCB, state environment impact assessment authority, Environment Consultants, Students, decision makers and Industries

Selection will be done on first come first basis

Environmental Impact Assessment (EIA) is an important tool to inform decision-makers, regulators and stakeholders, about the possible environmental, social and economic costs of the proposed project. To be effective, it requires the active involvement of all concerned stakeholders.

There is a genuine need to develop the capacity of the state-level regulators and state level expert appraisal Committee (SEAC) to screen and scope the EIA process, to conduct transparent public consultations and to evaluate the EIA reports, especially after the new EIA notification. At the same time, there is a need among CBO, NGOs, academicians, and environment managers to review and interpret EIA report, as they are technical in nature.

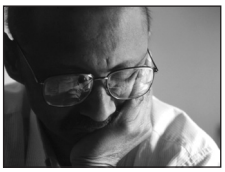
Centre for Science and Environment recognises this need and has developed a hands-on five-day training programme aimed at giving practical exposure to participants on EIA with specific reference to ***coal based power plant, cement, pharmaceutical, mining and others***. After the programme, the participants shall have:

1. Exposure to all aspects of EIA, from its theory to the practical – such as better understanding regarding
   - What data is required, how this data should be collected and interpreted, and significance of the data
   - Effectiveness of the assessment methods
   - What issues should be addressed in the terms of reference (TOR)
   - Tools and thumb rules available to evaluate the environmental impact of projects
2. Better understanding of the EIA process – from screening, scoping, data collection to impact assessment as well as the role of public consultation
3. Better understanding of the environmental and social impacts of the industrial and developmental projects
4. Better ability to review EIA reports and identify its strengths and weaknesses
5. Increased ability to play active role in post-EIA monitoring.

For registration: **Kindly email at: sujit@cseindia.org**

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