



**EDITORIAL** ▶▶

*My colleague Pranay Lal, who coordinates our health and environment unit, got a call from a reader of this newsletter. The doctor was interested in finding out if the advertisement released by BPL showing a pregnant woman with a cellphone pressed to her pregnant stomach – had any medical implications.*

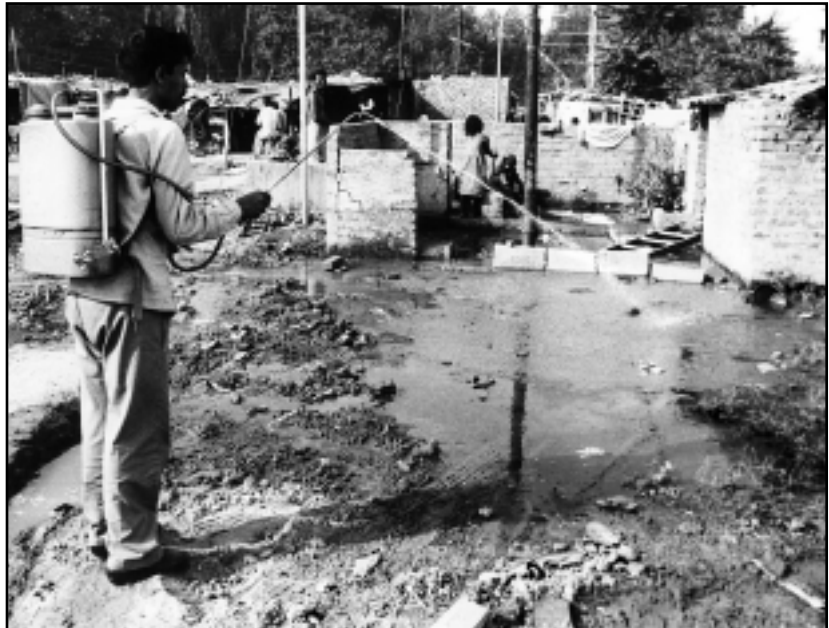
*What is the impact of cellphones on human bodies? This is a hotly debated issue in scientific circles and it is clear that the jury is still out of the final decision. On the one hand studies – many industry sponsored – show that there is little evidence of a causal relationship between cancer and radiation from cellphones, other studies suggest that the link exists and is deadly. I don't intend to discuss the merits of this specific case with you. What-ever the final verdict on the electromagnetic pollution and its toxicity, I will discuss two, what I believe are related and critical issues.*

*First, there is the issue of the role of private funding for public research. There is growing concern about the need to promote transparency in funding of research, which affects public policy. The growing influence of drug industry funding on academic research and the growing number of cases where data is withheld, spun or otherwise manipulated when results are disadvantageous to the*

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**LEAD STORY** ▶▶



AMIT SHANKER / CSE

**DEATH BY DDT**

## Double indemnity

The US and other developed countries banned the use of DDT in the 70s because of its alarming toxicity and possible carcinogenicity

Despite the ban, India sprayed 7,000 tonnes of DDT in 2001-2002

India has consumed 350,000 tonnes of DDT since 1985, for agricultural and public health purposes

Studies reveal Indians have one of the highest body DDT concentrations

Intensive use of DDT has made mosquitoes resistant to it

Dichlorodiphenyltrichloroethane (DDT) remains for the past three decades the preferred method of malaria control in India. This is despite its ineffectiveness and conclusive proof of mosquitoes showing triple resistance to the insecticides—DDT, benzene hexachloride (BHC) and malathion.

Doubts remain over DDT's safety and impact on the environment. In the international arena, the DDT debate continues. In December 2001, the Stockholm convention banned the use of the "dirty dozen", the 12 deadliest and most persistent chemicals in the environment. DDT proved to be the

*funder is now frequent and frightening.*

*A recent study published in the Journal of American Medical Association (JAMA), reveals that published statistics on new drugs are a scam like Enron. Washington Post wrote how a pharmaceutical company, Pharmacia Corporation, funded a study to show that a medicine, Celebrex works better than cheap alternatives such as Ibuprofen. The study collected 12 months of data, which showed no major advantage. But the authors selectively published the first six months of results, claiming that Celebrex had fewer side effects and this trick made patients spend US \$3 billion. Rigging data is very profitable.*

*This is not surprising. Science is hard money and politics and the stakes are high. Starting from tobacco research to drug trials and now the extremely contentious health and safety issues concerning genetically modified organism (GMOs) and cell-phones, it is important that public policy is not allowed to get manipulated or confused. The role of independent and credible research, therefore, becomes all the more important especially in an increasingly technocratic society.*

*What is worrying is that while industry has always supported some research, the balance of power in the collaboration between companies and academic institutions is shifting. Corporate research budgets are rising much faster than government and charitable foundations, making these institutions more dependent on industry sponsorship. Academics are facing increasing competition from the fast growing consultancy research sector, which is less constrained by traditions of independence and objectivity.*

*The second issue is that we have to exercise the precautionary principle in making decisions. Science, often cannot give us a precise assessment of the problem. It is because of this we need often to apply the precautionary principle so that even if the final risk assessment is still not done and the final scientific certainty is not known, we know enough to say that there could be a possible risk. Caution and precaution is what is needed. It is important because the stakes are too high. After all we are dealing with life here. Not money. Not politics.*

— **Sunita Narain**  
Director

most volatile and vexing issue. Some countries demanded the immediate banning of DDT on account of its harmful environmental and public health effects, while others supported its use in the control of vector-borne diseases, especially malaria.

Although the ineffectiveness of DDT is known, it is still being promoted. In countries where DDT is effective, not banning its usage is understandable, but in the case of India it is not. Arguments from pressure groups and malaria experts in India suggest that, in defending DDT's continued usage, it is better to save people now from malaria than worry about the deaths due to it in

the long-run. But need countries like India buy such an argument? Pro-DDT groups push for its usage wherever malaria occurs. Others believe that persistent organic pollutants (POPs) like DDT should be banned because they do not degrade easily, kill other insect populations indiscriminately, and affect animals - possibly humans — as well.

### Medicare or Malignancy?

During World War II, DDT was credited with having saved the lives of 25 million soldiers by protecting them against malaria and typhus, which resulted in the dramatic increase in the use of DDT after the war. World Health Organi-

AMIT SHANKER / CSE



### POP and India's Stand

On 23rd May 2001 India signed the convention banning the use of 12 most dangerous Persistent Organic Pollutants (POPs). The convention decided that the use of DDT would remain restricted to public health and be phased out once safer and more viable alternatives are found. According to T R Baalu, Union minister of environment and forests, an urgent need to review the implications and ill effects of DDT is required. Following the convention, a grant of \$50,000 from the Global Environment Fund was provided for United Nations Industrial Development Organisation (UNIDO) to prepare a plan within 6 months to tackle POPs.

sation (WHO) and the donor communities began depending on this stand-alone miracle compound to virtually eliminate malaria, dengue fever and filariasis. Until resistance was observed, DDT helped save millions of lives, especially in South East Asia, Latin America and India. In India, the decline in deaths caused by malaria was very evident, from 10 million in 1953 to 285,962 in 1961.

DDT's tremendous promise in controlling infectious diseases was questioned following the publication of Rachel Carson's book, "The Silent Spring", which startled the world on the long-term effects of DDT. At a hot DDT debate in 1965, called the Madison Conference, evidence was presented that pigeon and eagle populations were declining because due to DDT, birds

were laying infertile and thin-shelled eggs. Resistance to DDT was also seen in insects. In fish, it was found to be highly toxic. Its chemical stability and solubility in fat worsened the problem. DDT is not metabolised very rapidly by animals. Instead, it is deposited and stored in the fatty tissues. If steady ingestion continues, DDT builds up in the animal over time. In humans, the best indicator of bioaccumulation is breast milk. Even Inuit mothers in the pristine Arctic environment have traces of DDT in their breast milk and body fat!<sup>1</sup>

### A Toxic trail

DDT persists in the environment long after killing the insects, remaining unaltered for years. Several studies, including one conducted by the Indian Council of Medical Research (ICMR) in 1993, found alarmingly high levels of DDT, hexachlorocyclohexane (HCH) and other extremely toxic pesticides in vegetables, fruits and milk in Delhi, Maharashtra, Punjab, Andhra Pradesh and Uttar Pradesh. The average Indian diet contains 0.27 mg of DDT.<sup>2</sup> High levels of the pesticides have also been found in the carcasses of buffaloes, the main food of vultures. This possibly may have led to the disappearance of the ultimate scavenger.

DDT has in some cases been linked to the early onset of puberty.<sup>3</sup> Studies indicate a causative link of endocrine disruptors such as DDT to sexual precocity. In recent years, elevated concentrations of dieldrin (DDE), a breakdown product of DDT has been associated with the reduced lactation by mothers. Studies by K SenthilKumar show that the elusive dolphin and other fish in the Ganges have extremely high concentrations of DDT and other pesticides (see box: *Unholy ganges*, p6).

But despite the mounting evidence, the joint director of the National Anti Malaria Programme (NAMP), B R Thapar, maintains that DDT has no ill effects, noting "No adverse effects on the human health have been observed so far." In 1994 (the year DDT was meant to be phased out of use in agriculture) 300 scientists in India proclaimed that DDT remains the best option for control.

## Holy Flying Cats

In Malaysia, huts were sprayed with DDT to kill mosquitoes. DDT not only killed mosquitoes but also other insects, including wasps, which normally ate moth larvae living in these thatched roofs. Cockroaches that were found in the treated huts were fairly resistant to the DDT. Geckos that lived in the huts ate the cockroaches and died of DDT poisoning. Cats that ate the geckos with DDT in their bodies also died of DDT poisoning. Due to sudden scarcity of cats in the village following the DDT treatment, rats multiplied, which ushered the scare of bubonic plague. WHO arranged for cats to be dropped by parachutes to the remote village to replace those that had died and to eliminate the rats to prevent plague!

Source: J Duffs and H Worth 1998, <http://www.iupac.org/publications/cd/essentialtoxicology/IUPACDDT>

### Defenders of DDT

Most advocates of DDT are economists from western institutions. Prominent among them is Amir Attaran, director of international health, Centre for International Development, Boston, US. He believes that the merits of DDT far outweigh its problems. "DDT saves lives from malaria, and if properly used, causes very little harm to the environment." Carel Jsselduiden, professor of epidemiology, School of Health Systems and Public Health, University of Pretoria, South Africa agrees, "It is better to die at the age of 50-69 of cancer than to do die of malnourishment at the age of one."

Advocates believe that over the decades, the judicious use of DDT has saved tens of millions of lives from malaria and death. Attaran argues that the cost of phasing out DDT and replacing it with alternative malaria control strategies may be between US \$350 and \$950 million dollars annually. Another Harvard economist, Jeffrey Sachs, has found that if malaria had been eliminated in 1965, Africa's annual gross domestic product would be \$400 billion now, not \$300 billion. The fact that some individuals have taken in DDT everyday for decades with no harm has been held as an

evidence of DDT's harmlessness. The DDT "expert" Kenneth Mellanby used to eat a pinch of DDT every time he lectured on DDT over a period of 40 years.<sup>4</sup> Recent evidence shows that even where resistance to DDT has emerged, DDT repels mosquitoes from buildings, which have been sprayed. This is cited as another reason why DDT should be used despite knowing that it increases mosquito resistance.

The most frequently quoted study by the pro-DDT lobby is that by D R Roberts titled "DDT, Global Strategies, and a Malaria Control Crisis in South America," noting the extraordinary rise in the number of cases of malaria when DDT was no longer used.

Roberts comments, "No Country has ever implemented an integrated mosquito management programme, much less tested how well it works. Perhaps more disappointing is the fact that DDT seems the only solution for the control of a dreaded disease like malaria and there seems no hope for new innovations." It cites examples of benefits in Brazil, Mozambique, Ecuador, Zambia, Colombia and Peru due to the re-application of DDT (see graph: *DDT's dividend*). The pro-DDT lobby is dismissive of non-chemical alternatives to DDT, believing that alternatives such as Insecticide Treated Mosquito Nets (ITMNs) have their constraints, and that integrated vector control methods also require institutional innovation and people empowerment to be effective.

### Reckoning with resurgence

In India, the most strident critique of the emergence of DDT resistance was the Public Accounts Committee (PAC) report to the Eight Lok Sabha Committee. The PAC attributes the re-emergence of malaria to corruption and mal-administration at the grass-roots. It rests the blame on many state governments for not contributing their share for malaria control (malaria control programmes are funded on a 50:50 shared basis by centre and state governments). Many states did not invest in malaria programmes until such time as malaria assumed epidemic proportions.

The PAC report comments that DDT and other pesticides were diverted by

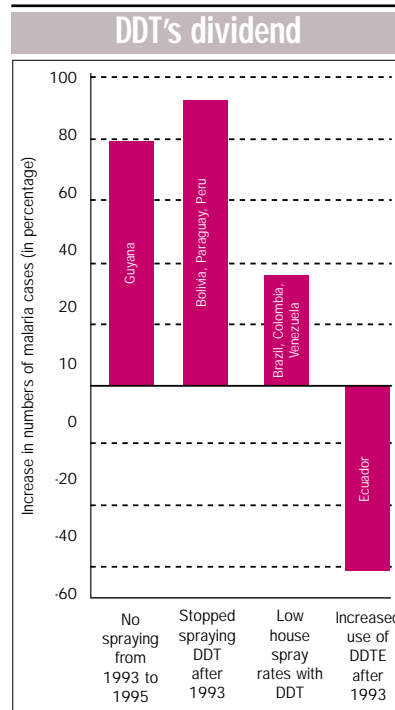
the rich and powerful for use in agriculture, leaving the communities bereft. Communities could only manage one round of spraying (sometimes no round at all), as against the recommended two or three rounds. Irregular application of DDT developed resistance in mosquitoes. The scope of triple resistance is spreading. The report also criticised pesticide-testing laboratories for not identifying fake pesticides.

The fact remains that DDT did work in India, reducing malaria incidence dramatically from a million cases to 285,962 cases. But malaria resurged due to bureaucratic oversight and improper administration. Today there are an estimated three million cases per year. The resurgence of malaria was marked by an increasing incidence of falciparum malaria, its deadliest form. In India, about 40 per cent of all malaria cases are falciparum. Malaria impacts the marginalised tribal communities very harshly because they have little or no access to medical facilities. India's tribal population constitutes 7.8 per cent of the total population but contributes to about 30 per cent of India's malaria cases and 75 per cent of deaths, 60 per cent of which are falciparum cases.

Increased resistance means increased use of pesticides and a concomitant increase in the cost of malaria con-

trol programmes. Pesticide failure is also partly due to the steadily climbing prices of pesticides. Currently, 70 per cent of all insecticides used in India are DDT and BHC, and their use is increasing at a rate of 6 per cent a year. The National Malaria Eradication Pro-

gramme (NMEP) continues to insist that there has been "no adverse reaction of DDT on human health".<sup>5</sup> The Indian government seems to accept NMEP's judgment as to the safety of DDT and routinely continues to use pesticides, paying no attention to the World Bank's recommendations (see box: *No change please: we are the sarkaar!*).



Source: D R Roberts et al 1997, DDT global strategies, and a malaria control crisis in South America, *Emerging Infectious Diseases*, Vol 3, No 3, p300.

### All things considered...

Arguments proposed by the defenders of DDT are applicable only for some select countries. India has its own unique constraints. Along with triple resistance in some parts, double or at least single resistance is observed in many other parts of India. DDT may only be a repellent.

The spread of resistance has been rapid, due the increasing range of the vector. According to a study done by UNICEF, distressed localised migration is highest in India, with nearly 10 per cent of the population moving every year from one location to another in search of better livelihood. The vector uses migrating people and their cattle to "hitch-hike" into new areas. Rapid deforestation, agriculture, irrigation, movement of susceptible populations and rapid urbanisation, all assist the vector in establishing in new ecosystems. Such problems are few in tropical countries like Ecuador, Peru and Bolivia.

## No change please: we are the sarkaar!

In 1997 the World Bank tried a different trick to combat malaria. It submitted a Project Appraisal Document on major proposed credit to India by the International Development Association (IDA), for an 'enhanced' malaria control project (EMCP) to be implemented by the National Anti Malaria Programme (NAMP) of the government of India (GOI). The objective of EMCP was to shift the financial focus of the existing programme from indoor residual spraying (IRS) to a more diversified approach involving a higher percentage of spending on areas such as medicated mosquito nets, institutional strengthening, epidemic response and intersectoral collaboration, and secondly, to shift from malaria eradication to malaria control (hence the word 'eradication' was

dropped from NMEP, which became NAMP).

IRS turned into a failure due to poor operational coverage, the development of vector resistance and the rising cost of using insecticides. Hindustan Insecticides Limited (HIL), set up by the government, mainly manufactures these insecticides. HIL is the sole producer of DDT in India and the second largest manufacturer of pesticides in Asia. The NAMP itself admitted that increased expenditure was used to pay for more expensive insecticides, adding that selective and decreasing vector control was the way ahead. Insecticide use had and continues to have significant adverse environmental implications invariably affecting the non-target organisms thereby disturbing the

ecosystem.

The EMCP favoured allocating 53 per cent of existing funding to IRS (down from 69 per cent). This new percentage would also apply to an increased fund base. The World Bank in its own project budget, allocated 40 per cent of funding for selective vector control allocation. The bank envisaged more targeted spraying, increasing non-insecticide vector control methods such as larvivorous fish and biolarvicides, and selecting environmentally neutral insecticides, instead of indiscriminate spraying of insecticides. Sadly, the recommendations were not implemented. In 1999, when the government of India reported on funding allocations for malaria control in India, the share of indoor residual spraying was again 69 per cent.

### Blind Acceptance

With no strategic vision or surveillance systems in place, it is not possible to prevent outbreaks from becoming epidemics. There is virtually no data for a very prevalent disease like malaria. Although climatic variations, migration, poor access to health facilities, poor civic conditions all contribute to the incidence of malaria, none of these factors are considered when developing malaria control programmes in India.

Around 80 organisations governing thermal power plants, dams, industrial estates and plants, waterways, coal fields and mines lack malaria control programmes. They do however significantly damage local ecology, which contributes to outbreaks and epidemics. Those few organisations that do have malaria programmes are independent of the national malaria programme. There is no shared vision when it comes to control malaria. Malaria can be controlled if the vector population is reduced using simple bioenvironmental interventions and innovations. Reducing transmission alone can reduce the incidence of malaria substantially.

### What may work!

A combination of strategies is the best solution to combat malaria (see table: *Ten strategies that can work*). Bioenvironmental solutions have worked well wherever they have been implemented.

In seven villages of Kheda district, Gujarat, the Malaria Research Centre (MRC) successfully introduced bioenvironmental measures, using larvivorous fish and draining stagnant ponds and ditches. Chemical use diminished during subsequent years as few mosquito-breeding sites remained and very few cases were reported. Unfortunately the project was not sustainable, as people were not provided with the capability to take on the project once funds expired. Malaria re-emerged in the subsequent years, and DDT use was resumed. The same is true for Kolar (Karnataka) and Hassan (Tamil Nadu). The MRC withdrew from the project, as there was little political will to support a grassroots innovation. In the Bharat Heavy Electrical Limited (BHEL) complex in Hardwar, there was

| Ten strategies that can work                                           |                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Strategy (in order of priority)                                        | Feature                                                                                                                                                                                                                                                  |
| Bioenvironmental methodologies                                         | Reduces the length of transmission season and prevalence                                                                                                                                                                                                 |
| People's participation                                                 | Reduces costs of projects and improves control and surveillance                                                                                                                                                                                          |
| Involvement of other stakeholders                                      | Large industries (thermal power plants, dam projects, mines, industries) contribute significantly to environmental change but are not integrated into malaria programme                                                                                  |
| Prophylaxis                                                            | Folic acid and vitamin supplementation for children and pregnant women improves immunity and reduces infections                                                                                                                                          |
| Active surveillance                                                    | Inter-sectoral collaboration to actively monitor vector populations and outbreaks, and devise specific control strategies                                                                                                                                |
| Adopt cost effective strategies                                        | Use of bednets and eliminate vectors during lean seasons                                                                                                                                                                                                 |
| Strict legal enforcement                                               | Responsibilities and accountability of stakeholders especially local communities if outbreaks occur or increase in vector populations. Legal action against municipalities and state government possible in cases when epidemics occur due to negligence |
| Access to medicine                                                     | Curative measures should be accessible to communities                                                                                                                                                                                                    |
| Integrate malaria control with other health and development programmes | Will reduce project costs and increase empowerment towards community health                                                                                                                                                                              |
| Mix of control strategies                                              | Use biopesticides and reduce dependence on chemical pesticides. Many local innovations reduce vector population                                                                                                                                          |

more political will and motivation to make the bioenvironmental project a success.

Globally, countries like the Solomon Islands, Indonesia, Malaysia, parts of Somalia and Comoros Islands have successfully used bioenvironmental control methods. In China for example, large rice farms required a lot of standing water, which increased the incidence of malaria. To reduce the extent of standing water, farmers now use just enough water to wet the fields on a regular basis. With no water standing, vectors are unable to breed leading to a reduction in their number by 50 per cent.

The DDT story may be repeated again with biopesticides. The most potent biopesticide, *Bacillus thuringiensis* (Bt) has already developed resistance in some mosquito species. Apart from resistance, biopesticides can only be effectively used in clear water bodies, as they lose their potency in dirty sewage and industrial water. This rules out their usage in most of India's stagnant drains and effluent streams.

Other strategies of malaria control include surveillance of vectors, surveillance of susceptible populations, motivating communities to report cases of fevers during malaria seasons, and providing communities with incentives

to protect themselves with bednets. Legal instruments to ensure responsibility for control can be taken. Legal action against municipalities and state governments is possible when epidemics occur due to their negligence. Ratlam and Bhilwara municipalities were dragged to court by citizens for negligence of civic amenities and the citizens won the case under the public nuisance act.

Each outbreak and every epidemic is an evolutionary success story for malaria, from oblivion to epidemic proportions. The very least governments can do is to keep a few paces ahead of the disease through constant monitoring, simple hygiene, collective action and some common sense.

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## Unholy ganges

SAMIR KUMAR SINHA

The Ganges, thought to be the holiest river of India, is no longer clean. It is polluted. And its pollution kills. Destroys habitats. The presence of polychlorinated biphenyls (PCBs), DDT and its metabolites and other organochlorine pesticides has been found in dolphins of the Ganges. The World Conservation Union regards dolphin as a vulnerable species. The decline in their numbers is a cause for concern for environmentalists and scientists. Very few studies have actually examined the accumulation of toxic contaminants of river dolphins. K SenthilKumar's study on *Bioaccumulation profiles of polychlorinated biphenyls and other pesticides in Ganges river dolphins* is unique that it attempts to study this very fact.

He and his colleagues of the department of environment conservation, Ehime University, Japan, have carried out the study. During 1993 to 1996, pesticide profiles in dolphins were measured through their blubber and the fishes that they ate. Since river dolphins are top predators in the riverine food chain, they are good indicators of contamination. At the same time, they are at great risk due to the presence of chemical contaminants in the rivers that they inhabit.

The continuous degradation and pollution of the river is affecting the dolphin population and resulting in their rapid decline. Construction of dams, increased boat traffic and fishing, and hunting of dolphins for meat and oil

have lead to their declining numbers. The presence of various DDT manufacturing industries around the holy river and the disposal of their waste in it has also resulted in high concentrations of DDT in the river. DDT concentrations in the Ganga were found to range between 0.07 and 143 mg/l, with levels often exceeding 1mg/l, a safe limit proposed by the World Health Organisation. The study reports high levels of DDTs in the blubber of river dolphins — in the range of 30 to 120 mg/g. Exposure to high concentrations of these pesticides have been known to impair the reproductive and immunological functions in captive or wild aquatic mammals.

SenthilKumar explains this elevated accumulation of DDT in the dolphins as due to the widespread use of DDT for malaria vector control and for the control of Kala-azar disease in India. The presence of high amounts of PCBs in the dolphins also suggests the presence of local sources of PCB contamination. Compare this with the North American Great Lakes and Baltic Sea, where concentrations of PCBs have been actually declining for almost 15 years. The study suggests that the close proximity of polluting industries near the Ganges combined with the dolphins' own lesser capacity to metabolise contaminants may be the reason for the river dolphins to be more vulnerable to toxic effects.

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## Review of recent

### Mexican success story

The Executive Director of the North American Commission for Environmental Cooperation (CEC) underscores the success of the initiative of Mexican DDT project to eliminate the use of organic pollutant. The project has brought together two communities, the health policy community and the environment community, to serve its purpose. The Global Environment Facility (GEF) regards it as the first project to work in accord to the Stockholm POPs Convention. Moreover, this DDT initiative exemplifies the efficacy of collaboration among international agencies. It is the first time the CEC, Pan American Health Organisation (PAHO), and UNEP have worked together to share resources to achieve maximum output. In today's world of limited resources, this type of synergy yields are indeed important.

<http://www.cec.org/news/details/index>

### Contaminated fish

The health of native tribes inhabiting the Columbia River basin is at risk due to fishes contaminated with polychlorinated biphenyls (PCBs), DDT, mercury and other toxic chemicals, that they eat. The Environmental Protection Agency (EPA) found 92 different chemicals in a variety of fish from rivers in Oregon, Washington and Idaho, according to an unreleased report. The Columbia River Inter-Tribal Fish Commission requested the study, in which scientists took 281 samples from 61 rivers and tested for 131 different chemicals. The study found higher than normal levels of DDT, PCBs and zinc in the fishes. The samples also found lower levels of highly toxic dioxins, arsenic and mercury in sturgeon, smelt and large-scale sucker. The findings have serious health implications for native people. Fish is an integral part of tribal sustenance. The average Northwest Indians eat fish 48 times a month. The EPA estimates a 70-year-old tribal member eating their regular diet of fish has a risk of cancer 50 times higher than anybody eating fish once a month.

'Deadly apathy' undermining whale conservation, *World Wide Fund (WWF)*, March 12, 2002.

### Lethal war remains

Every day, billions of pounds of deadly chemicals, many of which were used as chemical

## studies on DDT

warfare agents in World War I and II, are applied as pesticides and herbicides to soil, plants, and people around the US and the world. World Health Organisation (WHO) estimates over 200,000 people are killed by pesticides every year and every day 1.1 million US children eat food containing unsafe levels of organophosphate pesticides. Pesticides are often pervasive. DDT, banned in the United States in the 1970s, has been found in Antarctic ice, penguin tissues, and in most species of whales.

<http://eces.org/ec/pollution/ddt.shtml#top>

### Workers affected

Study finds occupational exposure to DDT in malaria-control workers significantly associated with permanent decline of up to 20 per cent in neurological functioning, increase of neuropsychological and psychiatric symptoms. This study investigates chronic nervous system effects of long term occupational exposure to DDT by comparing the neurobehavioural performance of retired malaria-control workers with a reference group. The DDT exposed group had overall poorer performance, with a mean decrease in performance of up to 20 per cent. The exposed group also reported significantly more neuropsychological and psychiatric symptoms than did the controls. The amount of decline was directly associated with years of DDT application. Even small changes in nervous-system functions induced by toxic exposure have important repercussions in elderly people because of their reduced capacity to compensate for impairment, resulting in accelerated aging. Discussions are continuing about DDT use in the control of malaria keeping in view its adverse effects on the environment and individual.

*The Lancet* 2001, VOL 357, No 9261, March 31.

### Cancer in wildlife

When examining 129 carcasses of the St. Lawrence Estuary (SLE) beluga (whale), scientists found cancer as a cause of death in 27 per cent of the adult animals. This percentage is not remote from what is found in humans. Scientists

think that the presence of contaminants such as heavy metals, DDT, PCBs and polycyclic aromatic hydrocarbons (PAHs) played an important role in the death of the beluga. Moreover, the human population living in the vicinity of the SLE seem more prone to contract cancer compared to those living in the rest of Quebec.

*Environmental Health Perspectives* 2002, Vol 110, No 3, March, pp285-292.

### The Hudson contamination

The US Environmental Protection Agency (EPA) has found the Hudson River in New York, USA severely contaminated with hazardous waste. Subsequently, the fish of Hudson River too are found contaminated with PCBs, chlordane and DDT. Anglers, the major consumers of this fish have managed to spread the contaminants. Anglers' sharing the caught fish with other people has made pregnant women and children exposed to these contaminants. EPA has brought up policies to clean up the Hudson and discarded approximately 150,000 pounds of PCBs.

*Environmental Health Perspectives* 2002, Vol 110, No 4, April, A 184-187.

### The Chinese story

Despite international denunciation of the use of DDT as pesticide, China continues

its usage. Along with other 31 countries, China has sought exemption from the Stockholm Convention to use DDT for malarial control. Scientists, obviously, are not looking forward to the impact that decade of DDT use is going to have on the Chinese public health.

"China's poisoned chalice," *Far Eastern Economic Review* 2001, October 25, pp50-52.

### DDT reservoir

High levels of DDT have sedimented 3,200 metres below the ocean surface on bed of Monterey Canyon, which spreads over 80 kilometres off the coast of Monterey, California, USA. Used excessively in the neighbouring farmlands as an agricultural pesticide in 1945, the soil at the bottom of the canyon now is running off the farmers' fields and reaching the rivers and streams. The contaminated sediment has now become a nuisance to the Californians.

*New Scientist* 2002, May, p18.

### Obsolete pesticides

The presence of about 500,000 tonnes of obsolete pesticides including DDT throughout the developing countries is being constantly overlooked. Many of these old stocks are either buried, or burned in open containers, or simply left outdoors to migrate into soil and water from leaking containers. Activists are calling for a need to create awareness about old pesticides can pose new problems for the developing world.

*Environmental Health Perspectives* 2002, Vol 109, No 12, December, pp A 578-579.

### The Stockholm convention

The need for global action to get rid of the toxic chemicals present in the environment is being felt for a long time. The Stockholm Convention on Persistent Organic Pollutants, adopted on May 22, 2001 is an important step taken to prohibit the production and use of DDT for the control of vector-borne diseases. The objective is to wipe out the use of DDT completely in addition to the introduction of practical and economically feasible alternatives.

*Our Planet* 2002, Vol 12, No 42002, pp 28-30.

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DDT Essay page  
<http://drake.marin.k12.ca.us/stuwork/rockwater/ddt>

World wild life report on DDT  
[http://www.worldwildlife.org/toxics/progareas/pop/ddt\\_report.htm](http://www.worldwildlife.org/toxics/progareas/pop/ddt_report.htm)



### Mixed reactions

In the fuel business, fuel is adulterated with such precision that even the fuel quality specifications and testing methods for its monitoring as specified by the Bureau of Indian Standards (BIS) are inadequate to detect the level of adulteration.

BIS itself specifies a broad permissible range for each fuel parameter, which allows sufficient margin for fuel operators to adulterate the fuel, without actually violating the specifications.

Adulteration becomes easy since fuel adulterants like kerosene and light diesel oil belong to similar hydrocarbon families as that of automotive fuels like diesel and have almost the same chemical structure. Other adulterants that are added include lead and various industrial solvents like hexane, heptane, mineral turpentine oil and raffinates.

Besides impairing engine performance use of adulterated fuel has serious health implications for the consumer. Addition of lead to gasoline refiners increases the ambient concentrations of lead.

Increasing levels of lead in the air is known to affect the intellectual development of children. Workers who work with lead are also prone to the health effects due to its presence in their midst.

With no research being done, very little is known about the actual health implications of adulterated diesel or petrol. Diesel by itself has been listed as a known carcinogen. How carcinogenic is adulterated diesel? No one knows. Research in this has to be initiated by the developing countries since this problem is specific to them. Developed countries do not report much of fuel abuse cases. Tightening of adulteration laws and standards and improving testing procedures for checking of adulteration will help improve the fuel quality and the clearing up of the air around us.

## BRIEFS ►

### Off the road

If the US government thinks that banning diesel combustion on the road will stop the environmentalists' clamour, then it's wrong. The State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials came up with a report saying that off-road diesel vehicles such as bulldozers and farm tractors account for 8,500 premature deaths and 180,000 asthma attacks each year. The report, they said, was to admonish Bush administration to adopt tough federal pollution emission standards so that off-road emissions are curtailed by more than 90 per cent.

Environmental activists are worried that due to the laxity on the part of the government in enforcing strong regulations against pollution, the diesel manufacturers are bound to benefit at the cost of public health. Frank O'Donnell,



ARS IMAGE GALLERY

executive director of the Clean Air Trust thinks that the loopholes in policy regulation regarding diesel use allows off-road diesel engines to contribute much more to pollution than diesel trucks and buses.

The United States Environmental Protection Agency (EPA) and the Office of Management Budget have now decided to join hands in order to monitor policies to curb emissions from diesel-powered, off-road vehicles. According to EPA, it will not only assess new emission control devices for new engines, but also the reductions in sulfur levels required for the effective use of the control systems.

Off-road diesel engines contribute to higher levels of ozone, soot, and the oxides of nitrogen. All of these com-

pounds affect public health negatively. However, the diesel engine makers' point is that it is wrong to expect a bulldozer pushing massive weights to abide by pollution guidelines applicable to small vehicles. Allen Schaeffer, executive director of the Diesel Technology Forum says that the off-road diesel engines perform very different works.

### Fluoridated water

Recently, the United States EPA has shown interest in the new species of compounds that may arise from the fluoride added to drinking water. In addition, it is concerned about the public health consequences of the fluorosilicates used to fluoridate drinking water.

The potable water systems in the US usually use hexafluorosilicic acid ( $H_2SiF_6$ ) and sodium hexafluorosilicate ( $Na_2SiF_6$ ) as fluoridating agents. These species dissociate in water to give negatively charged fluoride ions. This dissociation, and the subsequent release of fluoride ions, involves a complex, multi-step equilibrium reaction, not yet fully understood. The data collected so far from the researches on the kinetics of the dissociation reaction might prove helpful to study the pharmacological and toxicological effects of the reactions of the fluoride ion as it interacts with other chemical species in drinking water.

The objectives of these studies would be to help the policy makers and scientists to safeguard the quality of the nation's drinking water. In 2000, Edward T Urbansky and Michael R Schock, two EPA scientists came up with a paper on fluorosilicates used to fluoridate drinking water. They were the first to remark that fluoride ion is reactive in tap water and can react with minerals such as aluminium. Fluoride ions form a complex with aluminium in water to give aluminium fluoride. Research on rats show that aluminium fluoride is easily transported across the walls of blood vessels to cause neurological damage. This is enough to imply that compounds such as aluminium fluoride are not innocuous to humans.

### Tea cure

After research, scientists have confirmed the longstanding claim that drinking green tea is good to health.



The research done by Mimi Yu at the University of Southern California (CA, USA) and a US-Chinese collaboration present data on the protective effect of drinking tea on gastric and oesophageal cancer. The scientists believe that certain tea extracts and polyphenols are the protecting agents in animals. In case of humans, frequent green tea drinkers are less prone to contract these cancers. The researchers carried out a continuous case-control study of 18,244 men aged 45-64 years, since 1986 in Sanghai, China. They compared 190 men with gastric cancer and 42 having oesophageal cancer with 772 men without cancer. Each of their urinary concentration for polyphenols and their metabolites were measured. The researchers found that the urinary epigallocatechin (EGC) was related to lower risk of both cancers. In addition, the protective effect of tea consumption was found to be efficient among individuals deficient in other dietary antioxidants such as carotenes: antioxidants found in carrots, spinach, and other vegetables and fruits, which are also thought to reduce risk of cancer. According to Fung-Lung Chung of American Health Foundation, the protective effect of tea catechins in stomach and oesophagus suggest that tea may be effective against cancers of the digestive tract due to the way it is ingested. Green tea, according to Yu, contains ten times more ECG than black tea does. Tea comes from the plant *Camellia sinensis*, believed to contain powerful antioxidants. Antioxidants such as EGC combat free radicals (charged particles) produced by the body, which may harm a cell in such a way that the cell may mutate and succumb to cancer.

### Cancer-causing air

According to the EPA, at least two third of Americans are exposed to cancer-causing chemicals. EPA has also stated that this has drastically elevated the risk of their developing cancer. An in-depth analysis of 32 toxic chemicals collected from the emissions in 1996, has made EPA reach this conclusion. The study predicts that the exposure to various toxic chemicals can result in 10 in 1 million cancer risk throughout the US. Moreover, it highlights a disturbing fact that 20 million people live in worse areas where the risks are even higher, such that 100 in 1 million are at risk. Although EPA takes a cancer risk of 1 in a million or greater as consequential, Jeffery Holmstead, head of the EPA's air office, says that the risks of cancer from toxic chemical exposure is very small when compared to the risk due to other cancer causing factors. Holmstead suggests using the data to serve as a baseline for further studies on cancer risks due to air pollution. Since 1996 when the data was collected, the risks now have been significantly reduced.

However, the environmentalists take the findings as strong evidences against air pollution, which ask for effective policies to minimize the releases of carcinogens, such as benzene, mercury, and formaldehyde, from automobiles, power plants and industrial sources. According to the study, automobiles and trucks contribute considerably to air pollution.

### Appetite for destruction

If the US is the fastest place under the sun then it is also the fattest. The faster they get the fatter they get — it is not just a bad pun but also a fact — the

amount of fast-food consumption in the US is frightening and its consequences, disturbing. According to a report by the US Surgeon General, the obese per cent population rose from 46 per cent in the late 1970s to 55 per cent in the early 1990s, which in turn increased to 61 per cent in a report published a few months back. Obesity is the cause of 300,000 premature deaths in the US every year and results in \$117 billion worth of annual medical bills.

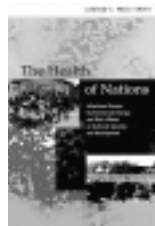


PREETI SINGH / CSE

Fast food is the primary source of obesity in the US. Therefore, the only way to curb obesity is to discourage fast food production and consumption. Health regulations ought to be framed wherein it is mandatory for the fast food producers to disclose fat and calorie content of their produce so that the people can judge whether the food is healthy or not. In addition, fast food vending machines in schools ought to be replaced with health food vending machines. Above all, government should regulate policies to put an end to the unscrupulous practice of the companies of using misleading health claims to promote their products. For example, the National Pork Board advertises pork meat as "the white meat," whereas pork's fat and cholesterol content resembles red meat rather than any other white meat.

## B O O K R E V I E W

THE HEALTH OF NATIONS: INFECTIOUS DISEASE, ENVIRONMENTAL CHANGE, AND THEIR EFFECTS ON NATIONAL SECURITY AND DEVELOPMENT- Andrew T Price-Smith-2002-pp 232-US \$22.95



A good review of interdisciplinary study analysing emerging infectious diseases' effect on economy, growth, and security. Global infectious diseases (like tuberculosis, HIV, malaria, cholera) and the diseases of unknown origin demonstrate that their effects can be measured and quantified, and are effective socio-political economic indicators. The author talks on how infectious diseases can influence a nation's stability and prosperity. Poverty due to infectious diseases can result in intra-state violence, thus increasing the political instability of the nation, and having long-term effects on its regional economy. The results can be damaging international relations and a downslide in development. In a very interesting way, the author links the effects of global environmental change on the spread of disease to the feedback loop between public health and shows how this affects the nation's economy and political stability.

## Organic farming



ARS IMAGE GALLERY

Centre for Resource Education (CRE) is running a campaign to promote organic farming. CRE aims to provide people with an alternative to non-organic agricultural produce, grown with the help of harmful pesticides. Pesticides, ingrained in the non-organic crops, are harmful to the health of the consumers. The farmers are even more exposed to the pesti-

cides as they are in its direct contact.

India accounts for one third of pesticide poisoning cases in developing countries. Abnormalities such as blindness, cancer, premature delivery, abortions, deformities, and liver and nervous diseases occur frequently throughout India due to pesticide poisoning. However, despite considerable risk that pesticide usage subjects its people to, India lacks an effective pesticide policy. Unfortunately, the use of pesticide in India is increasing with time, as pests are becoming more and more resistant to it. In addition, rising population demands more crops, which in turn necessitates the use of more pesticide. We can take an example of the cotton farming: due to strong pest resistance coupled with excessive demand, cotton farmers use the most pesticide in India. CRE, with the help of research, educational, and awareness programs and campaigns wants to break this vicious circle. The campaign to promote organic

farming is one of CRE's such noble and novel efforts.

To back its "organic farming" campaign, CRE, with the help of Toxics link in New Delhi and Sarvodaya Youth Organization, Warangal, has conducted a research on pesticide exposures in Warangal district. A report based on this research was published in January 2002, called *The Killing Fields: farmer deaths due to exposure to pesticides in Warangal district*. According to the report, a systematic, continuous monitoring of the situation would reflect impact of pesticide on public health and ecology. CRE was also the leader of the first National Organic Conference held at Bidkin in Maharashtra.

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## Thanal against toxins



SOPAN JOSHI / CSE

Thanal is an environment-oriented society with a broad network. 'Toxic Alert Group' of Thanal carries out studies and runs campaigns and educational programs dealing with toxins in the environment. Currently, the group is working on forming a students' network to spread awareness about toxic-based issues. To aid its mission, the group publishes a monthly Newsletter,

"Toxic Alert-Keralam." The group aims to relieve the environment of the industrial toxins and pesticides.

In November 2001, Thanal came out with a comprehensive report on the "Long Term Monitoring of The impact of Pesticides on the People and Ecosystem (LMIPPE)" at Kasargod. The report brought to attention the health problems of the people of Kasargod, who have been affected by the spraying of the highly toxic organochlorine pesticide, endosulfan.

Thanal is formed of cooperative individuals who make it possible to work on an informal basis. The core group designs and coordinates the programmes. Group members have been funding the programmes so far. Some of the members undertake project responsibilities according to their personal capability. "Gathering for all beings" is one motto of Thanal, and "Quest for Survival" another.

When it was first registered as a society in 1986, Thanal's concerns were "Natural History Studies" and

"Nature Education." In 1993, Thanal came up with the "Teacher and Environment Network" — a forum to motivate teachers on propagating environmental education. The forum today has 350 teachers in the mailing list. Thanal, in 1994, launched the "Nature Club Council," which now co-ordinates body Nature Clubs of India. The council has over 500 schools in the mailing list. As a service to the clubs registered in it, the council offers audio-visual, reference, and program design and back up facilities. Along with a full-time coordinator, the council has many volunteers working for it. The council also has two regular publications and occasional discussion papers. The members collected 0.153 million signatures for an appeal to the Indian Prime Minister asking to pay more attention to tiger conservation.

*To join this movement, contact:*  
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## Readers write in

The newsletter has set for itself high levels of competence. The physical format is handy, and convenient to hold while reading, the layout is simple and the linkages placed so appropriately. I suggest that editions of this newsletter may be done in Hindi and other major languages so that it reaches to the maximum of people in our country.

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I found the second issue, with the lead story on asthma, very interesting; it covered the subject in great detail, and provided valuable facts and figures. I hope future issues of the newsletter will deal with other major health and environmental problems in a similar manner. The first-person account by Anil Agarwal is a moving one, and is the true story of an 'environmental victim', with lessons for all of us.

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The newsletter is crisp, informative, enlightening and easy to read. Keep up the good work!

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Its nice to learn that your centre is making serious efforts to bring out issues related to common person and Child in special by keeping references to current researches. The contents are useful to any one for enhancing his knowledge about exposure of his life to carriers of death. I hope you shall enrich

the newsletter with more articles on current issues such as radio contamination etc besides regular threats to human life.

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The health and environment unit team has the joint responsibility to bring the standard of newsletter to the level that it attains the status of Environmental alert affecting public health. I am confident that it will be able to sensitise the medical community about the same.

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By publishing "The story of an environmental victim", a superb piece by Anil, you have done a yeoman service to the country. It would be a fitting tribute to Anil if this parting piece by him succeeds in creating awareness about the epidemic of environmental pollution with carcinogens and teratogens.

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CSE's Health and Environment Newsletter invites comments, suggestions and views.

If you are interested in receiving the copy of the newsletter, do write to us. Join our network.

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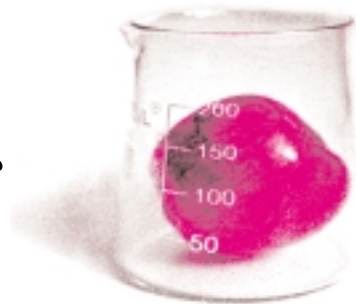
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Working on a proposal of DDT and cancer. Creating cancer awareness and education regarding linkages between environment and cancer.

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Specialises in medical audit and medical ethics. Worked on pesticides and pregnancy outcomes, congenital anomalies and radiation hazards. Has also carried out a study on the level of air pollution in the city of Jaipur with the increase in the number of vehicles, and its health effects.

# An apple a day may not keep the doctor away



How fresh is a red apple? Don't trust your eyes. It is lined with harmful pesticide residue and heavy metals. And it is not only the apple. Most of our foodstuff and the water we drink are suspect materials for our health.

But we cannot complain or build up any meaningful and informed opinion against it. We are helpless as we lack scientific data.

Centre for Science and Environment, as part of its commitment towards a clean and safe society, has started a state of the art laboratory dedicated to detect deadly pesticide residue and heavy metals in our foodstuff, beverages, water and bloodstream. It also undertakes testing of water for a complete profile of pollutants, even for individuals. We encourage civil society organisations around the country who are into mass movements against pollution to come forward and use this facility to test any "suspect" material.

## CSE POLLUTION MONITORING LABORATORY

For details, contact:  
Pollution Monitoring Laboratory  
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**CSE's Health and Environment Newsletter is a bi-monthly bulletin, with the objective of bringing into focus the various issues of environmental health. A free publication, the newsletter is targeted at doctors, environmentalists, NGOs and policy makers concerned with the state of our environment.**

**To enable us to forge closer ties with our readers and to enrich our association, we look forward to your support. Cheques or Demand drafts may be remitted in favour of:**

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Other stories related to environment and health are available at our website: <http://www.cseindia.org>

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