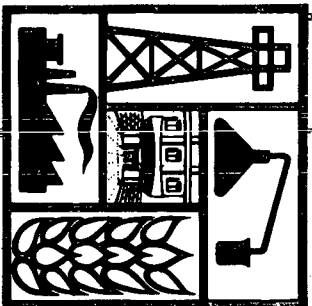
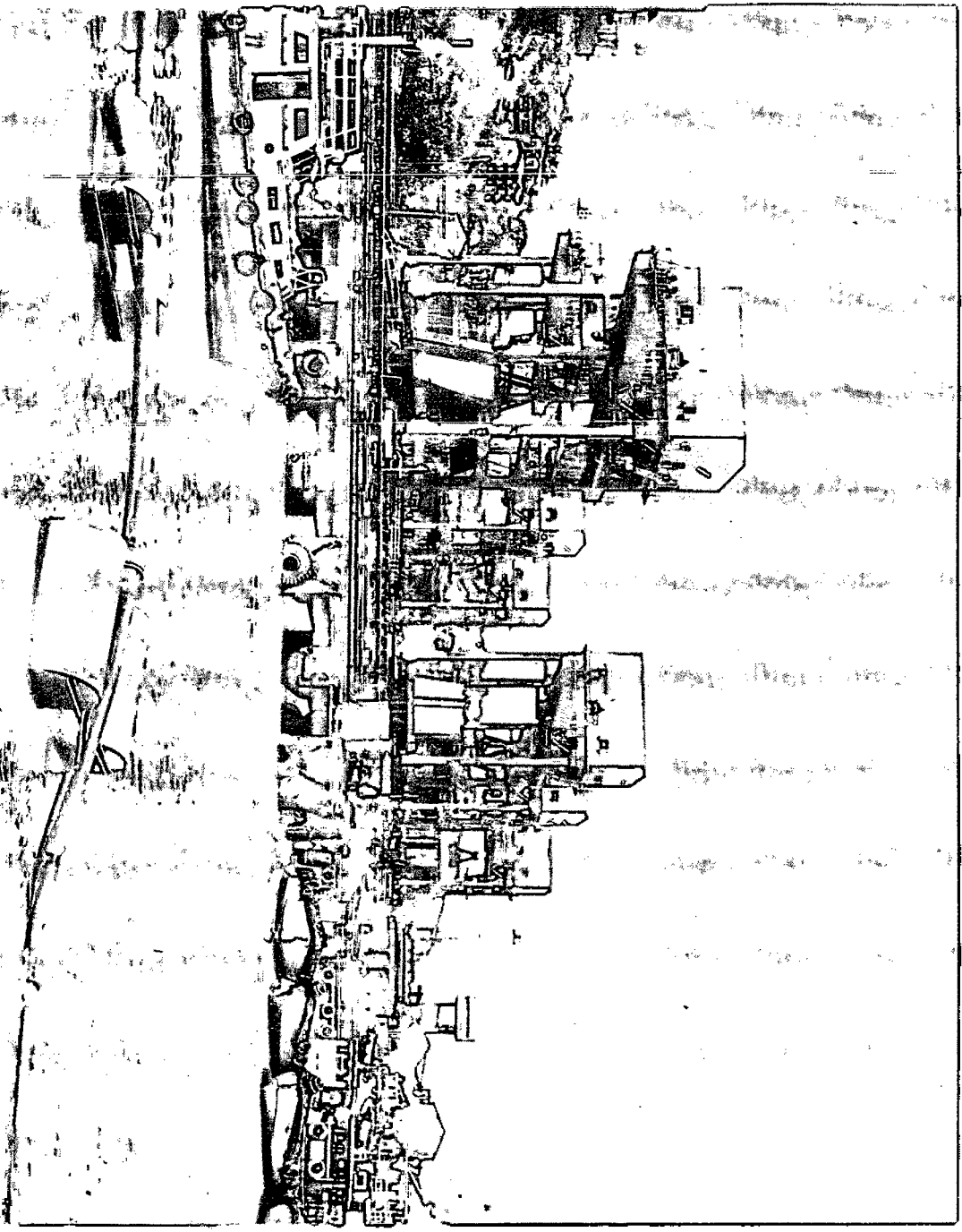


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Development Diary

Chemical Industry Turnover Set To Cross Rs. 1 lakh Crore

The turnover of the Indian chemical industry is likely to cross Rs. 1 lakh crore by the turn of the century from Rs. 90,000 crore in 1996-97. The chemical industry accounted for 10% of the total Indian exports during 1996-97. The total exports of chemicals and allied sectors in 1996-97 was to the tune of Rs. 12,000 crore. The chemical sector is one of the fastest growing sectors in India. The Government is liberalising policies to attract foreign investment. The chemical sector has been freed from licensing barring a short list of hazardous products. Similarly in the pharmaceutical sector, only 5 bulk drugs are reserved for manufacture by the public sector undertakings and majority of the chemicals, petro-chemicals and pharmaceuticals can be freely imported and exported.

NSS For AIDS Awareness

The Universities Talk AIDS (UTA) programme of the National Service Scheme (NSS) under the Department of Youth Affairs and Sports is to be expanded in a big way by 1999-2004. It will be called Students Talk AIDS under the broader theme, Youth for Youth Health. The approach will be two pronged: Youth to Youth and Campus to Community. Apart from the college and school students, the non-student youth of the adopted villages/slums will be covered under this scheme.

Besides, 32 counselling centres and 32 life-style education centres will be established covering each state and union territory. For documentation, evaluation, trainer's training and undertaking research, the existing training centres of NSS, i.e. training and orientation centres (TOCs) and training, orientation and research centres (TORCs) will be strengthened. Distant learning materials will be developed for the non-student youth to upgrade their knowledge on HIV/AIDS and related issues. It will also be covering other aspects of health such as, reproductive and adolescent sexual health, alcoholism, intravenous drug use, smoking etc.

Till October 1998, 8049 programme officers and 68,869 peer educators have been trained and 65 lakh youth have been made aware of AIDS/HIV in 6785 colleges and +2 level institutions covering 175 universities. UTA was launched in 1991 as a result of a unique collaboration between WHO and the Department of Youth Affairs and Sports.

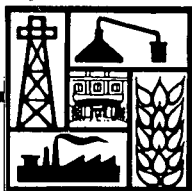
Stress On ISM

The Union Ministry of Health & Family Welfare has decided to involve Indian Systems of Medicine in the Reproductive & Child Health programmes in a bigger way by including ISM medicines in the kits to be supplied to the auxiliary nurse midwives (ANM). Initially 25% of the target population of pregnant mothers and children of 0-5 years in the states of Assam, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh will be covered under this scheme.

Some of the Ayurvedic drugs include:

- i) Punarvadi Mandoora—for anaemia, edema, piles and intermittent fever.
- ii) Saubhagya Shunthi—after delivery it regulates involution, lactation and clears uterine discharge, prevents body ache, obesity etc.
- iii) Ksheer-Bala Taila—oil massage for babies and mothers after delivery. Taken orally, this oil can strengthen nervous system in mothers and also cure *vata vyadhi*.
- iv) Ayush-Ghutti—for children as it prevents cough, cold, vomiting, indigestion, diarrhoea.
- v) Bala Rasayana—strengthens the body and immune system of children.
- vi) Pudina Ark—for vomiting, indigestion and intestinal problems.
- vii) Ajwain Ark—helpful in indigestion and relieving intestinal problems.

The government is also working on similar drugs of Unani and Siddha systems.



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Euro And Its Impact

K.R. Sudhaman

ELEVEN EUROPEAN UNION countries would have single European unified currency called Euro from January 1, 1999 which is seen as a revolutionary step. Though this central monetary unit will officially replace deutsche mark, French franc or Italian lira on the first day of next year, it will be three years before these European currencies totally disappear and the entire monetary transaction carried out fully in Euro. The eleven European countries which will adopt this single unified currency are Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain. They have decided to introduce this single Euro Currency after meeting the conditions established by the Maastricht Treaty to move on to the single currency.

The four other member countries of the European Union which are presently not joining this arrangement now are Greece, United Kingdom, Denmark and Sweden. Greece which set itself the objective of joining the Euro in the year 2001 was not admitted. United Kingdom and Denmark used their right acknowledged in the Maastricht Treaty, not to participate in the Euro. Sweden did not meet the criterion of belonging to the European monetary system and the exchange rate mechanism and hence expressed its wish not to take part in the first wave of the Euro.

The decision to move on to the single unified currency was taken after the European Monetary Institute, which is the forerunner of the European Central Bank, certified that economic convergence of these 11 countries had vastly improved since 1997.

With the exception of Greece, all the member states have conquered inflation

with Italy, Portugal and Spain in particular managing to spectacularly reducing inflation to keep it below the reference value of 2.7 per cent during the last 18 months. Fourteen of the 15-member European Union are successful in limiting their public deficit to less than three per cent of Gross Domestic Production ensuring that the public finance is durable and healthy.

The criterion of public debt having to be less than 60 per cent of the GDP was met by four countries only—France, Luxembourg, United Kingdom and Finland. However, the treaty stipulates that this ceiling could be exceeded if the ratio of the debt fell sufficiently to approach the reference value at a satisfactory level.

With the introduction of Euro on January 1, 1999, the German deutsche mark, the French franc, the Spanish peseta, the Italian lira, the Dutch guilder, the Belgian franc, the Luxembourg franc, the Austrian schelling, the Finnish markka, the Portuguese escudo and the Irish punt will no longer be quoted on the foreign exchange markets and government securities markets. This is because the monetary units of these various countries making up the Euro zone will become simple non-decimal subdivisions of the Euro. These 11 national monetary units will nevertheless continue to circulate and be used alongside the Euro for three years until spring of 2002 giving ample transition time for switchover.

Euro will be issued and administered by a European System of Central Banks (ESCB) comprising an European Central Bank (ECB) whose headquarters will be in Frankfurt, Germany and whose President, Duisenberg, a Dutchman, and 11 National Central Banks will prepare and execute the decisions of the Governing Council.

The European single currency will both be denationalised and very largely depoliticised. Euro is in response to an old aspiration for monetary and economic stability in Europe, which is a guarantee of sound and lasting growth.

From India's point of view, the main advantage would be lower transactions cost for Indian exporters. India could also benefit by the trade diversion effect.... exports to the European Union.

K.R. Sudhaman is an economic writer.

This stability will primarily benefit the Euro zone; but it will also favour greater equilibrium in the international monetary system.

Adoption of Euro has mainly three advantages for the member countries. Firstly it will provide monetary stability. A situation of monetary crisis like the one which rocked Europe in early 1990 and led to realignment of parties of certain currencies within the European monetary system and the removal of others from the system, could not happen again. Because of its size, the European Central Bank can more easily absorb the shocks of any disruptions.

Secondly, it will ensure low interest rates promoting investment and consequently an upturn in the economy, resulting in job creation. For consumers, this development is likely to bring down mortgage rates. Thirdly, it will help these 11 countries to move towards zero exchange risk. Fixed parity will mean greater transparency of prices for goods and services paving the way for stronger competition leading to lower prices for the consumer and new business and cooperation opportunities for European firms.

Above all, Euro is expected to provide a balancing factor for the world monetary system which is presently dominated by U.S. Dollar. Because of the size of its market and its position as the world's main commercial and economic power, Euro is likely to become a factor of attraction which will make it in the medium term, a world currency of trade, investment and reserve equal to the U.S. Dollar.

The eleven member states constituting Euro area will represent 290 million inhabitants compared with 268 million for the United States and 126 million for Japan. It will represent 19.4 per cent of world GDP as compared with 19.6 per cent for the United States and 7.7 per cent for Japan. The eleven account for 18.6 per cent of world trade as compared with 16.6 per cent for the United States and 8.2 per cent for Japan.

The statistics show the Euro will no doubt become a serious challenger to the

Dollar as a medium of global commerce. U.S. Dollar presently account for 62 per cent of the world currency reserves in contrast to 20 per cent for European currencies. With the introduction of Euro there will be a reallocation as the dollar is being overused with respect to the size of the U.S. economy.

Main Advantage

From India's point of view, the main advantage would be lower transactions cost for Indian exporters and one estimate says it would be reduced by as much as 50 per cent. India could also benefit by the trade diversion effect increasing the country's potential to expand its exports to the European Union.

The best example to illustrate this point is India can increase its textile exports by setting off unutilised quotas against one country with that of the other. Secondly increased investment would result in higher imports by the member countries after Euro comes into being.

The greatest advantage of Euro for Indian trade will be reduction in exchange rate volatility. It is well known that exchange rate volatility creates negative influence on trade. It can reduce the volume of trade by creating uncertainty about profits to firms. If covered by a risk premium, prices rise by the risk premiums and depress trade. Presently the volatility in the exchange rate of EU currencies other than Deutschmark and the British Pound are said to be relatively high. With the Euro coming into operation the volatility of Euro currency is likely to be much less and immensely helping the traders.

This has been corroborated at the recently held World Economic Forum's India Summit in New Delhi where experts were generally of the view that Euro would signal political and financial stability in European zone, promoting better trade with Asia particularly with India.

The experts were unanimous in saying introduction of single unified currency in Europe will bring an opportunity for Asia to forge a stronger trader partnership between Euro Zone

and India.

Reserve Bank's Chief General Manager Ms. Shyamala Gopinath pointed out that with the launch of Euro, credit rate would be largely determined by a fixed exchange rate which is a positive sign.

She observed that India would look at aspects like consolidation and rationalisation of accounts after Euro became operational as at present there are 11 nostrum accounts. RBI would also look at the credit line available that translated into further investment opportunities; consider the choice of accounts given; regard diversification of the sources of borrowing, explore and renew contracts; enjoy the advantage of a unified market; have a huge growth potential, have the choice of being the customer and supplier in both Euro as well as other currencies; and avail of price transparency in trade.

Some analysts are however of the view there might be high pressure of governance on the Euro zone countries and that India needed to upgrade its level of preparation in order to carry out operation in Euro. Also there is a need for India to spread its risks, taking a lesson from the East Asian currency meltdown. This is all the more important because Euro would be a strong reserve currency with the European Central Bank having a large gold reserve and the European Zone being a large market that would vie with the rest of the world.

There is bound to be several advantages and a few disadvantages for promoting trade once the Euro is launched on January 1, 1999. For proper adjustment to this historical phenomenon, the three-year transition period is crucial.

But the real impact will however be known only when Euro becomes fully operational after the three-year transition period and how well it is accepted world over. On the face of it Indian exporters and importers could only benefit rather than being put to any disadvantage as trade transactions would become much more easier. □

New Dimensions In The Context Of Euro

Vijaya Katti

*Indo-German
development
cooperation aims at
attaining a balance
between
strengthening the
economic
infrastructure and
the reform process on
the one hand and
alleviating poverty on
the other.*

NOTWITHSTANDING THE MARGINAL share of India in the global trade of Germany or even in German trade with developing countries, India's trade with Germany has grown significantly since 1970. Germany's negative trade balance with India increased consistently since 1970-71 and reached its peak in 1986-87. It then fluctuated and has declined since 1989-90. India's imports from and exports to Germany have increased after unification. Growth in exports has been more than in imports and the reduction in the trade gap can be attributed to this fact.

Germany's main trade partners are the EU countries as also USA and Japan. In the world-wide ranking of Germany's trading partners across the globe, India ranked 30th among suppliers and 30th as a buyer of German goods. Indian imports from Germany declined to 4456 mil. DM in 1997 from 4685 mil. DM in 1996 registering a percentage change of 4.89. Share of Indian imports in total German exports in 1997 has been 0.5%. Indian exports to Germany increased from 3977 mil. DM in 1996 to 4151 mil. DM in 1997 registering an increase of 4.39% in 1997. Share of Indian exports in total German imports in 1997 has been 0.55%.

As can be seen from the table-1, percentage shares of leather and leather manufactures and carpets handmade have gone down in India's total exports. Percentage share of gems and jewellery

has more or less remained the same whereas that of cotton yarn fabrics and made-ups has gone up marginally. Percentage share of cotton readymade garments including accessories has fluctuated in this period. These five items accounted for 63.6% of India's total exports to Germany in 1987-88. Their share has come down to 55.9% in 1996-97. Obviously, some other items have assumed more significance in India's export basket to Germany. Other items which have gained importance in last five years include transport equipment, computer software, handicrafts including handmade carpets and plastic and linoleum products.

Calculations on the basis of data from the above table reveal that percentage share of transport equipment has gone up from 1.05% in 1992-93 to 1.97% in 1997-98. Percentage share of computer software has gone up from 0.025% to 0.13% and that of plastic and linoleum products has gone up from 0.4% to 1.13% in the same period. Percentage share of handicrafts including handmade carpets has, however, been fluctuating and has gone down from 2.27% to 1.68% in the same period. Percentage share of these four items in India's total exports to Germany was 3.74% in 1992-93. This has gone up to 4.92% in 1997-98 indicating thereby the shift in commodity composition that has taken place in India's exports to Germany in post unification period.

German Investment

Since 1991, when the economic reforms were introduced German investment in India has gone up by 15%. However, Germany is more prominent in the number of sanctions than in regard to the volume of investment. One reason for the lower volume of investment is that the majority of German collaborations bringing in their new technologies into India are small and medium sized companies. Another reason is that the

Table-1

India's Major Exports to Germany 1987-88 to 1997-98

Year	Leather and leather manufactures	RMG Cotton incl. Accessories	Cotton yarn fabrics made-ups	Percentage share		India's total exports to Germany Rs. Mln.
				Carpets handmade	Gems and Jewellery	
1987-88	23.2	18.8	7.5	10.26	3.88	106191
1988-89	20.6	15.67	5.54	11.91	4.34	123631
1989-90	20.8	15.16	5.65	10.32	4.62	199421
1990-91	25.06	15.09	6.88	8.67	3.39	253459
1991-92	21.91	15.18	7.02	11.99	3.51	313061
1992-93	21.11	16.38	6.84	11.06	3.32	413300
1993-94	20.81	16.58	7.36	10.99	3.62	482779
1994-95	20.67	16.4	7.79	7.90	2.94	548757
1995-96	20.23	17.42	8.23	6.87	3.34	661442
1996-97	18.07	18.39	8.99	7.04	3.39	671035
1997-98	n.a.	15.67	8.48	5.71	3.03	689195

Note: Calculations done on the basis of data from DGCI&S, Calcutta & Ministry of Commerce, New Delhi.

German collaborations are mainly in respect of technical products and not for consumer goods.

While ranking second after USA in terms of the number of collaborations sanctioned, Germany's position has however, slid from fifth in 1996 to seventh in 1997. USA is the largest investor, followed by Mauritius, UK, Malaysia, Korea and Japan. Mauritius has assumed special position due to its favourable agreement with India for avoidance of double taxation.

A comparison of India's foreign investment inflow from major sources during the nineties reveals irregular volumes with respect to countries like Saudi Arabia, Thailand and Israel. Investments during the period 1991-96 is concentrated in one or two large projects in a particular year with little or no investment in the other years. For countries like Germany, UK and USA, the annual inflow has been relatively steadier and more constant. It is also pertinent to note that the percentage of actual inflows to approvals for 1991-98 has also been quite high in the context of

Germany compared with other countries as is clear from the following table.

Traditionally concentrated in the core industries like industrial machinery, chemicals and pharmaceuticals, electrical equipment, machine tools and automobiles, Indo-German industrial cooperation is diversifying into relatively new areas in the nineties. In 1996 and 1997 there are sanctions in the area of computer software, food and beverages, trading,

textiles and garments and in financial sector. Most of the collaboration agreements in the newer fields are with financial participation as well.

Development Cooperation

India continues to top the list of German partner in development cooperation. Between 1958 and 1997, Germany's commitments to official development assistance for India amounted to more than DM 17.1 billion. Out of this, around DM 12.5 billion are funds of Financial Cooperation (FC) in the form of highly concessional loans and grants, including DM 2.2 billion finance credits of KfW, more than 1 billion as Technical Cooperation (TC) between the Governments and another DM 2.0 billion are mainly grants of the German government for projects of non-governmental organisations, e.g. political foundations and churches, or for training and scholarships for Indian technicians and professionals. Germany also contributes a large share of multilateral assistance to India through the World Bank, the Asian Development Bank, the European Union and the United Nations.

Indo-German development cooperation aims at attaining a balance between strengthening the economic infrastructure and the reform process on the one hand and alleviating poverty on the other.

Table-2

India's exports of other items to Germany
Value in Rs. Lakh

Year	Transport Eqpm.	Computer software	Handicrafts handmade carpets	excl. Plastic and linoleum products
1992-93	4367.18	103.95	9392.53	1590.12
1993-94	5734.02	152.83	12579.7	3201.63
1994-95	7407.79	221.02	15850.28	4005.63
1995-96	11476.59	744.59	15225.12	7116.25
1996-97	10572.33	344.38	12508.6	7841.21
1997-98	13641.73	898.83	11589.8	7794.67

Source: DGCI & S, Calcutta and Ministry of Commerce, New Delhi.

With the overall aim of poverty alleviation, both sides agree on the following priority areas of cooperation:

- rural development and agriculture
- human resource, especially health and education, including vocational training, and cooperation in the field of science
- environment
- infrastructure, especially power and transport
- finance and industry.

In the Indo-German government negotiations on development cooperation in New Delhi end of April, 1997, German bilateral commitments to the Indian Government amounted to DM 720 mi of which DM 220 mi are financial cooperation funds in the form of highly concessional loans (DM 120 mi) and grants (DM 100 mi). DM 450 mi are finance credits by KfW to be mixed in suitable projects with concessional loans. In September, 1997 the Federal Government committed an additional loan of 70 mi DM financial cooperation funds for the fertiliser sector programme. New technical cooperation commitments to the Government of India amount to DM 50 mi. In addition to its commitments of official aid to the Indian Government, the Federal German government in

Table-3
FDI and Foreign Technology Agreements approved in India 1991-1998

No.	Country	Total	Financial	Technical approved nos.	% of total
1.	USA	2598	1450	1148	19.68
2.	Germany	1566	756	810	11.86
3.	UK	1132	686	446	8.57
4.	Japan	887	342	545	6.72
5.	Netherlands	633	383	250	4.8

Source : Indo-German Chamber of Commerce.

1997 also granted DM 80 mi to support NGO projects in India.

Under financial cooperation the bulk of new commitments (DM 739.8 mi, including 69.8 mi for reprogrammed funds) relates to the energy sector (promotion of renewable energy resources through IREDA and investment programmes for reforms in the power sector) for which DM 604.8 mi have been made available. Of this DM 450 mi is finance credit by KfW. The housing for economically weaker sections of the society is to be promoted through new funds for HUDCO and HDFC amounting to DM 85 mi, out of which 50 mi come as grants. The new grants for rural development programmes of NABARD (DM 35 mi) and for primary health projects (DM mi) have also been approved.

The commitments of technical cooperation (DM 52.7 mi, out of which

DM 2.7 mi come from reprogrammed funds) concentrate on the continuation of current projects, in particular in the field of vocational training. Thus DM 6.7 mi for Central Instructional Media Institute in Chennai, DM 13.0 mi for the Tool Room Programme, DM 5.5 mi for the Technical Training Centre CRISP in Bhopal have been made available. In the field of protection of environment and of natural resources the funds for the Industrial Pollution Control Project with NPC (National Productivity Council) have been augmented by DM 2.5 mi and the funds for the Watershed Management Project with the Ministry of Agriculture by DM 5.0 mi. Finally a new commitment has been made for a substantial participation of the technical cooperation in a primary health programme in West Bengal (DM 9.5 mi).

Euro And Indo-German Trade

Introduction of Euro, the single currency of the European Union, from 1 January, 1999 is expected to bring the biggest transformation in global financial markets. The Euro will be the legal tender in the financial market and all non cash business transactions from 1 January, 1999. Euro notes and coins will start circulating only from January, 2002 and Euro will be the only legal tender in the EMU from July 2002.

Single currency means unified monetary policy. This is the first time in the history that the sovereign states are voluntarily giving up their right to

Table-4
Approvals vis-a-vis Actual inflow of FDI

Sl. No.	Name of the Country	Approvals 1991-98 (Up to March)	Actual inflow 1991-98 (Up to March)	% of actual inflow to approvals
1.	USA	40469.16	5362.62	13.25
2.	Mauritius	17306.44	8643.84	49.94
3.	UK	10783.7	1764.06	16.35
4.	Japan	6883.7	1688.47	27.25
5.	Germany	6195.5	1769.57	28.56
	Total including others	158765.66	35331.96	22.25

Source: Indo-German Chamber of Commerce

manage the exchange rate policies. It will create the largest single currency market replacing that of USA. Euro will have several implications for the world.

- ◆ The introduction of a single currency Euro will facilitate 'four freedoms' i.e. goods and services, capital, labour and information and foster integration - into an Economic Union without national borders.

The Euro will re-arrange European market structures and Indian companies have to re-orient themselves.

- ◆ Euro will facilitate price transparency. The input prices (labour costs of capital) and the output prices (products and services) will be easily comparable within the Euro-bloc. There is a high probability of convergence of prices at the lowest level which will result in tough price/cost competition.
- ◆ Transparency is expected to give rise to greater degree of competition between corporations for market shares, profitability and innovation.

As far as corporate sector of India is concerned, the Monetary Union will not disturb the existing agreements valid beyond 1999/2002. There is a possibility of choosing the settlement currency in the parallel currency phase from January 1999. Afterwards there would be an automatic change-over to Euro. There would be no change in terms of payment as well as periods of payment. However, the EMU would necessitate a change-over in the software (multiple account coding). It would also involve: Invoicing in Euro, New structuring of European trading

partners, Improved market-entry opportunities and adoption of new pricing strategies.

1. Invoicing in Euro

The EMU countries will carry out their foreign trade largely in Euro since it will replace different national currencies and US\$ as foreign trade currency of the EMU countries.

2. New structuring of European trade partners

For the trading partners the advantage of the introduction of the Euro would be falling costs for transactions and safeguarding the currency. Further, through the common EMU clearing system, one bank will be sufficient for processing all payments in the future. However, the disadvantage would be that importers throughout Europe will be subject to increased transparency.

Many companies will make an internal change over to the Euro during the course of 1999 and hence all suppliers will be forced to invoice in Euro. It would mean high start-up costs for them but massive savings are expected in the following years.

The Euro will re-arrange European market structures and Indian companies have to re-orient themselves. At present some of the far-reaching changes of the market structures in Europe are: penetration of companies into new markets, strategic alliances, market consolidations and emergence of new Euro/Global players. The objective is no longer to remain at top positions in the domestic market but to have Europe-wide (better global) top positions. This gives rise to an emergence of new trading partners at European level.

3. Improved market-entry opportunities

The EMU will further enhance market entry opportunities. Better transparency and currency security increase India's chances of penetrating

the integrated European market via the existing bridgeheads: the UK and Germany.

Today more than a quarter of India's exports to the EU are from the medium/high-tech sector. The EMU could mean further expansion of exports especially for high-tech products (car components, electronics), software, plastic products/chemicals etc.

4. Adoption of new pricing strategies

Currently there are considerable price differences for identical products in the individual European markets. Increasing internationalisation of purchasing leads to improved information and accelerated reduction in prices. Purchasers will always demand the most favourable price in Europe.

The objective is no longer to remain at top positions in the domestic market but to have Europe-wide top positions.

Germany is the most important trading partner of India in European Union. Percentage share of Germany in India's total exports to EU is 20.37% and in case of imports it is 23.81% in 1997-98. German market is very unique where quality is the buzzword. India needs to cater to the requirements of this market with consensus efforts. There is simplification through harmonisation of legislation/introduction of economic uniformity which is a good starting point for Indian companies. The prerequisites for market success therefore would be:

- a) high quality products & services.
- b) superior market entry strategy. □

Trends In Mass Communication In 21st Century

J.S. Yadava

Growing importance of satellite based electronic media which is making global television an increasing reality today, need to be properly appreciated as it opens up enormous new vistas for marketing goods and services regionally and globally. India certainly can emerge soon as a major player in global television.

"Radio waves never respect frontiers, and from an altitude of 36,000 kilometers, national boundaries become singularly inconspicuous. The world of the future will be an open world".

Arthur C. Clarke

WINDS OF CHANGE now sweeping across the world are paving way for an open world. Today, the advances that man has made in the area of communication technologies is so fundamentally transforming the organized human life that many social scientists speak of the dawn of a new era—the Information Age.

With the 21st century knocking at our door, media has assumed significance, which it had never seen before. Starting as an institutionalized approach to generate awareness and inform the masses, media has become an instrumentality to govern our lives. Rather than a form of cultural expression it has a culture of its own. It was supposed to report on the way of life of people. It has now become a way of life itself. Moreover it is one of the most important industries of our time.

Many of the societies are already changing from being advanced industrial societies to 'information societies' in which computer technologies, their networks and other enhanced form of interpersonal and institutional communication are a major force. Some of the Western countries have already entered into the

information age. In the United States, the information activities engage more than 46 per cent of the work force, which earned over 553 per cent of the labour income.

The giants of American communications are in the process of building a vast web of electronic net works "information super high ways" of fiber optics and computer network which will deliver an abundance of services, offices and homes—video images, phone calls, enormous amount of data on various required fields by the user/customer. They promised to change the way people work and live.

The vision of communication abundance has been possible because of the sharp decline in costs. According to an estimate the cost of microprocessors is falling 22 per cent, computer memories cost is down by 40 per cent and that of communication equipment by 11 per cent per annum. By the year 2000, may be even earlier, the cost of a computerized home system should be about the same as that of an automobile today, thus coming within the reach of the common man in the developed countries. The protagonists of the new communication technologies have been promising a revolution of abundance and diversity of information for all.

Let us also briefly examine the characteristics of the new communication technologies that have been fast changing the information environment in the latter part of the twentieth century. As a matter of fact, most of the so-called new communication technologies have been with us for the last couple of decades. What is relatively new is the convergence and integration of these technologies. Another feature of the present day situation in communications is the scale of operations, which the microprocessors and the 'chips' have not only made possible, but economically too. The results of these two processes,

convergence and scale, are revolutionary.

The convergence of emerging telecommunication technologies and computers is transforming business operations, broadcasting, telephone systems and human interactions in general. We are on the threshold of having a high-resolution two-way video and personal computers tied to networks, so that sitting at home or office, one can receive and send information from and to anywhere in the world, and engage in a two-way video conversation across the world.

As the world shifts to a service-oriented economy, vast amount of money, goods and services are being circulated as well. In the last few years break through in satellite and high-speed computing have given leading users an over-whelming economic advantage over those who have not kept pace. Thus, the stakes in new communication technologies are high and are of global dimension. Although for foreseeable future, the responsibility, if not power, to plan and decide about communication will continue to rest with the nation-states, already many of the operations are beyond them. The result is enormous expansion and significance of multi-national corporations.

Through multi-nationals and other trade channels the advanced Western countries are pushing hard the new communication technologies in the Third World countries to maintain their economic and political interests. The 'push' is sustained by the 'pull' force for the 'latest' and the 'best' on the part of the ruling elites in the Third World countries.

Thus, in brief, there have been revolutionary changes in technologies of mass communication, which are both challenges and opportunities. The new fervour for modernisation and progress through adoption of the latest communication technologies enhances the capabilities of communication at

various levels, both within and outside the organization. Technologies increase the efficiency in terms of speed, spread and also in terms of books and appearances. With latest mass communication technologies one is able to multiply one's messages fast enough and also reach the intended audiences quickly or even instantly. One may also

There is perhaps no parallel in human history to the speed and extent of spread that has been witnessed by satellite television in the last one decade.

produce attractive information/communication packages. But enhancement of capabilities is not necessarily an assurance for effective communication.

With this broad spectrum of changes that have taken place in communication technologies serving as a backdrop, I would focus my discussion here on two most important related developments (i) satellite television and (ii) information super highways that have taken place in the closing years of the 20th century and are likely to have enormous implications in the 21st century as well.

Satellite Television

There is perhaps no parallel in human history to the speed and extent of spread that has been witnessed by satellite television in the last one decade. Nowhere is it more striking than in India. There has been a sea change in the reach and access to television with the spread of satellite cable operation since it made a beginning at the time of Gulf War in 1991.

The new technologies demolished the monopoly of state run radio and television operations and the laws and regulations governing such operations ineffective. Further, the availability of

channels originating from outside the country has led to worries about an invasion from the sky.

The pioneering effort to show live the Gulf War by CNN established the technological feasibility of the satellite-based television globally. Soon after a Hong Kong based consortium of companies launched STAR TV (Satellite Television for Asian Region) and started beaming via satellite (Asiasat) television programmes through five channels viz. STAR Plus, MTV, Prime Sports, Zee TV and BBC World Service. With the opening of skies and breaking of nation-state boundaries for satellite television rapid globalization of television scheme is taking place. Consequently, television news, views and entertainment flows are free and global. Satellite television today has emerged as a new frontier in international relations and an important tool of marketing goods and services globally and regionally cutting across national boundaries.

While the availability of plurality of television news and views sources and variety entertainment programmes is generally welcome, there are serious apprehensions about the likely consequences of this freedom and choice on national strategic interests.

How the 24 hours availability of news and views gathered with western perceptive and the entertainment programmes depicting western culture and life styles are going to affect the world views and the social and cultural life styles in India and other Asian countries?

How our children are being influenced by the 'onslaught' from the skies? What economic and political implications the global television offers for the less developed countries? These are some of the questions that are being debated in highest policy planning fora, business circles, international conferences, coffee houses as well among family members at homes.

Already as many surveys have

revealed that Doordarshan audience is fast changing over to satellite cable television. The process has been somewhat slowed down with the launching of Metro channels and the satellite channels. The upper middle classes in cities are already hooked to STAR TV, CNN and BBC World Service. Hindi channels ZEE TV and ATN are also becoming popular further cutting into Doordarshan's viewership. About 12 to 15 per cent of satellite cable television owners are estimated to have stopped watching Doordarshan completely. Even in the case of news bulletins there is a perceptible decline in viewership. With this commercial advertising on transnational satellite channels is becoming attractive to many an Indian company with likely adverse effects on Doordarshan earnings.

While most countries in Asia and South East Asia are generally conservative in allowing freely the use of satellite linked cable television, India is more liberal in this regard. China recently banned the use of dish antenna for receiving foreign television

True to its age-old traditions of not putting any restrictions on cultural influences coming from outside and foreign lands, India has not put so far any constraint on the new cultural showers from skies.

programmes except of the foreigners in China. Singapore, although exports dish antenna and other equipment required by the cable operators in many South Asian countries and earn millions of dollars as profit, does not allow her own citizens to use dish antenna for receiving STAR TV or other foreign programmes directly. Malaysia and Indonesia do not allow use of dish antenna freely. In Malaysia only the

King and some other dignitaries can have this facility.

True to its age-old traditions of not putting any restrictions on cultural influences coming from outside and foreign lands, India has not put so far any constraint on the new cultural showers from skies. Concerns are being expressed and debate is on at various levels. In the meantime, small and big entrepreneurs in large numbers across the country have seized the opportunity. Taking advantage of technological feasibility they have innovatively set up their new business providing variety of entertainment as well as news and information at a price to their customers. Investing a couple of lakhs of rupees in a dish antenna and other equipment, the cable operator operating from her/his own home or small business outfit and serving a given locality or community, more or less like a grocery shop is meeting the entertainment needs of people living in that area.

Estimates about the number of cable operators in India vary from 25 to 50 thousands, with investment over Rs. 3 to 4 hundred crore, each has a clientele of about 200 to 500 households, with a total reach to 15 to 20 million people. They are providing choice to their customers in variety of entertainments such as Western Music (MTV), Soap Opera, Sports, Zee TV, Hindi channel largely film based programmes, Hindi and even regional language films through video channel as well as hourly news across the world through BBC World Service and CNN. Some enterprising cable operators, though relatively a very small number, have even become small time programme producers. They, besides distributing programmes received through satellite channels and video films, show videotapes or even live the local cultural activities and functions to their customers. Some of the political parties and the contesting candidates have also used cable and satellite television for

campaign adding a new dimension in electioneering in India.

Enormous Choices

Thus, satellite and cable television in India beside becoming a big economic activity involving thousands of entrepreneurs, offers enormous possible choices from global to local, western and foreign to indigenous and ethnic television programming for entertainment, news, current affairs and

The electronic mass media industry is fast becoming a major sector in economy of many a developed country.

education as well. It provides both enormous challenges and opportunities depending upon our response to technological possibilities and feasibilities that have opened up due to the revolutionary advances that are taking place in communications.

Asia is an area of great opportunities for international television services. The fierce battles are ahead among the major global players in the field of entertainment and information industries. The American CNN, BBC and STAR TV are fiercely competing for audience share in Asia and South East Asia. Some more regional and global television companies are joining the race soon. These are promoting their interests to become not only economically viable but also profitable media business ventures in Asian markets. In Asia the transnational media firms see great opportunities for international television business *per se*. In addition through transnational television programming they are influencing and capturing the minds of the people in favour of their other products and services thereby acquiring and exercising powers to influence international economic and political relations globally.

The electronic mass media industry is fast becoming a major sector in economy of many a developed country. More than many other industries the electronic media industry has been affected by growing internationalizing and globalization of its market place. Consequently, the electronic media which were largely the state monopolies

India can be a major player in globalization of television given the diversity and richness of its cultural heritage.

in most of the developing countries are now facing serious threat and competition both from emerging domestic media firms and the powerful international media giants. With the winds of liberalization blowing globally and technological developments facilitating the process, privatization and internationalization of electronic media is taking place in many a countries.

New entrepreneurs are mushrooming as cable operators in India and many large media firms from developed countries are investing across national borders in transnational global television enterprises. International media operations contribute profitably to the domestic earnings. For instance in 1991 foreign sale accounted for about thirty-nine per cent of US film and television industry revenue. As such stakes in globalization of television are economical as well as cultural and political.

In the circumstances, India cannot afford to be merely helpless spectator on the sidelines when fierce battles for minds and share in economic pie are being waged for shaping the emerging global village. Rather, India can be a major player in globalization of television given the diversity and richness of its cultural heritage,

traditions, values, historical places, architecture, music, arts, folk forms and natural beauty of its mountains, sands, seas, fauna and flora. It also has well developed film industry with rich traditions and experience of making excellent films together with fairly strong talent and capabilities of good television and production programming. Together with this India's own technological capabilities in satellite communications and vast entrepreneurial reservoir of skilled and innovative people India can not only compete but even do better than the multinational media giants in television production and programming for both domestic and international markets.

The threats or challenges posed by STAR TV, CNN, BBC and others by offering international television services could in fact be turned into opportunity and serve as stimulus for unleashing the creative energies and potential of our people and media professionals, who given the opportunity, are quite capable of indigenously producing and marketing television programme based upon our cultural heritage, diversities and natural beauty. Of course necessary orientation and training need to be organized to stimulate new approaches to production, packaging and marketing television programmes together with upgrading their technical and professional skills required for the purpose. India is a large television market segmented along languages, regions and cultures, each segment having potential audience larger than that of the TV audiences in many a European country. Therefore television programming capturing the ethos, the idioms of the people and the regions with local flavours and yet meeting their entertainment and information needs are likely to command large audiences regionally as well as nationally at the same time having good potential for marketing these internationally as well. In educational television also India utilizing its rich experience of SITE,

open universities, other educational and development broadcasting over the years can enormously expand and improve educational television to meet the needs for better educational facilities through electronic media.

Information Superhighways

"Information Superhighways" is the new conversational buzz world. Its content and meaning is often illusive. Nonetheless it is frequently tossed around in discussions about recent developments in communication technologies.

Different people mean different things when they speak of information superhighways. It is like the story of an elephant and the five blind men, each one looking at it from his own limited perspective.

Be that as it may, there is an enormous interest and debate in recent years on the subject, especially since Mr. Al Gore, Vice President of United States, made it a major policy issue of the US Administration.

A communication revolution is underway. A new "National Information Infrastructure" is rapidly moving into place—which will carry video, audio, and information into offices and homes across US. Its

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emergence will produce fundamental shift in American life, transforming everything from work to education to government to culture. It is expected that the information superhighways or National Information Infrastructure will help stimulate US economy and

maintain competitive edge over other countries.

With digitalization and fiber optics hitherto separate technologies and services are merging and integrating into one large interactive communication system offering consumer services, 500 channels of interactive television and the electronic marvel of cyberspace and virtual reality. Technologically speaking all these are now within reach.

Consequently traditional boundaries between different communication/media related industries are becoming blurred. Fierce battle is on for survival and operating space between different media industries as well as among companies controlling and operating these industries and service. Earlier U.S. regulations provided for monopoly operating rights in a particular area for assured access to its services in the given area to all citizens. The regulations also provide that if a company providing one service say telephone it can not enter into another communication, say television or newspaper industry. With the technological integration of communication industries and services the present restrictive regulations are being changed, allowing merger and take over. Now telephone company can provide other communication services say television, cable services etc. and vice versa.

Although the Clinton administration is committed to National Information Infrastructure, the administration sees the Government role as confined to nurturing technologies through appropriate legislation and incentives, but leaving the actual creation and operation of the electronic highway to the private sector.

In October (1993), the biggest corporate merger in history Bell Atlantic serving 18 million customers and 8 lakh cellular phones with TCI No. 1 cable company with franchise in many states serving 13 million subscribers

and having a powerful stake in television programming through its ownership of Liberty Media and also partly owning Turner Broadcasting is reflective of the emerging scenario of mega media conglomerations.

The combined Bell Atlantic and TCI Company are worth more than the gross national products of most nations. Such corporate giant capable of marshalling the enormous resources needed to build the electronic superhighway are pitching in for their share of pie in the promised era of abundance and prosperity, both for the consumer and their shareholders.

In addition to Bell Atlantic and TCI corporate giants like Time Warner,

Growing importance of satellite based electronic media which is making global television an increasing reality today, need to be properly appreciated as it opens up enormous new vistas for marketing goods and services regionally and globally.

Paramount, Bell South and Pacific Telesis to mention just a few are committing billions of dollars to today's telecommunication gold rush in their race to stake out tollbooths on the new electronic superhighway. It has many similarities of California Gold Rush of 1849.

The multi billion dollar rush to build the interactive electronic superhighway is prompted by dreams of the financial bonanza to come from home delivery of movie on demand, electronic shopping, video games, push button financial transactions and unlimited personal access to all kinds of data and information.

But test results of the pilot projects in Cerritos, California, and Columbus, Ohio, were not very encouraging raising doubt that even if the interactive electronic highway is in place would American people use it to the extent making the whole project economically viable.

Internet Success

Even so, the unexpected runaway success of Internet is an example of unintended but good consequences. The computer network linking defence establishments is not by free market enterprise but was established by the Pentagon spending federal taxpayers money. Ordinary civilian 'discovered' Internet and started using it by connecting their phone modem and personal computers transmitting and sharing all sorts of information—personal, scientific, political and data banks. Internet is now a huge electronic superhighway regularly travelled by a virtual community of million of diverse enthusiasts through the nation and the world.

In brief, information superhighway, the buzz word whose meaning is elusive, invokes variety of images and promise a whole new brave world not in a distant future but within 5 to 10 years or even earlier. Certainly it will be a major force in the 21st century. In someway if it already there. It is essentially a network of network. Some of these are already operating providing variety of services.

Telephone, cable, broadcasting, newspapers, magazines, data banks, department stores, libraries and laboratories are all getting integrated through computers, fiber optics, digitalization, phone and television. Like highways in US (nation-state) massive road infrastructure is in place enabling citizens to move to any place and anytime not dependent upon the public transport system and not restricted to time schedules, electronic superhighway would enable citizens to

(Contd. on page 35)

Drip Irrigation And Water Management

S. Kannan and S. Gurumurthy

INDIA HAS THE world's largest irrigated area. From 22.6 m ha in 1951, the gross irrigated area in the country has touched more than 92 million hectare.

There is an urgent need to utilise the available water resources in more efficient and cost effective manner by increasing the yield per unit of water used. The major opportunity in increasing irrigation efficiency at the farm level lies in adopting suitable methods of water application. Drip irrigation is a recent development in irrigation technology, provides an efficient method of water application and helps in the achievement of twin objectives of higher productivity and better water management.

Drip irrigation is an advanced method of irrigation accepted even in the developing countries by which water can be supplied directly into the root zone of the soil. In the world 1784, 846 ha is under micro irrigation of which India occupies 7th position with 70,859 ha. Though India has had phenomenal growth in the development of micro irrigation, the coverage is less than 0.1 per cent of the total irrigated area of 82 m ha.

Significant Development

An Israeli Engineer, Symcha Blass, developed drip system in 1940. In India, drip irrigation was introduced in the early seventies at the agricultural universities and other research institutions. Significant development has taken place only in the eighties. The growth of drip irrigation has really

gained momentum in the last five years. From a mere 1500 ha in 1985, the area under drip irrigation has grown to 6000 ha in 1988 and then to 7,01,859 ha at present. The development has taken place mainly in areas of acute water scarcity and in commercial/horticultural crops, such as coconut, grapes, banana, fruit trees, sugarcane and plantation crops in the States of Maharashtra, Andhra Pradesh, Karnataka, Tamil Nadu and Gujarat.

The area under drip irrigation and cropwise coverage are furnished in the following table 1 and 2.

Table 1. Statewise coverage of drip irrigation

Sl. No.	States	Area under drip irrigation (ha)
1.	Maharashtra	32,924
2.	Andhra Pradesh	11,585
3.	Karnataka	11,412
4.	Tamil Nadu	5,357
5.	Gujarat	3,560
6.	Kerala	3,035
7.	Madhya Pradesh	1,415
8.	Rajasthan	304
9.	Assam	180
10.	Haryana	120
11.	Uttar Pradesh	111
12.	West Bengal	100
13.	Other States	756
Total		70,859

Table 2. Cropwise coverage

Sl. No.	Crop	Area under drip irrigation (ha)
1.	Flowers	40.0
2.	Fibres	463.4
3.	Nuts	2,924.3
4.	Oilseeds	149.7
5.	Orchards	32,673.4
6.	Plantation crops	11,799.6
7.	Spices	185.0
8.	Vegetables	1,537.0
9.	Others	21,086.6
Total		70,859

There is an urgent need to utilise the available water resources in more efficient and cost effective manner by increasing the yield per unit of water used.

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Components of Drip System

1. Suitable type of motor and pump designed to deliver required quantum of water into the system.
2. Filter unit either gravel or volume filter needed according to purity of water.
3. A stainless steel wire mesh is wrapped over the perforated PVC pipe and tied. This is connected to the mainline at the end of the delivery pipe.
4. Mainline usually PVC tubes. The size of this is to be decided according to the quantum of water conveyed into submains.
5. Submains generally HDPE tubes of 40 or 50 which stand maximum 4 kg/cm² pressure.
6. Lateral lines of HDPE tubes of 16 mm (or) 12 mm on which drippers are fixed.
7. The drippers are of two types: one is threaded type dripper help to maintain uniform pressure and ensure equal supply of water to every plant. Another one is special pressure compensated drippers ensures uniform supply of water to all points even in slopes with high gradients even if there is variation in the line pressure.
8. Micro Tubes: Piece of black LLDPE thin tubings (4 mm ID) are used to connect drippers with laterals. One end of the microtube is attached to lateral and other to dripper. The length of microtube varies according to the distance of dripping point from the lateral.
9. Fitting Accessories: Some accessories are needed for assembling the whole unit. They are: gate valve, hose collar, start connectors, reducers and plugs for main, submain, laterals etc.

Lay out of drip system

Depending upon the situation, main

pipe is laid out along or perpendicular to length of a field. Submain runs perpendicular to the main and laterals are laid perpendicular to the submain along the rows. Main lines and submain pipes are buried at about 30 cm below the ground.

Merits of Drip Irrigation

1. Water saving
2. Enhanced plant growth and yield
3. Saving of labour and energy
4. Most suitable to poor soils
5. Control weeds
6. Economy in cultural practices and easy operations.
7. Possibility of using saline water
8. Improves efficiency of fertilizer
9. Flexibility in operation
10. No soil erosion
11. Easy installation
12. No land preparation
13. Minimum diseases and pest problems.

Demerits

1. Persistent maintenance cost
2. Salinity hazards
3. Economic technical limitations.
4. High skill is required for designing the installation and subsequent operations.

The following are the major constraints encountered in bringing large areas under drip irrigation method.

- High initial costs
- Quality of the drip material— clogging of drippers and cracking of lateral pipes

- Lack of awareness among the farmers
- Inadequate technical inputs
- Damage due to rodents
- High costs involved in spares and accessories
- Difficulty in getting subsidy
- Insufficient extension and promotional activities.

Remedies

For tapping the full potential of this system, the constraints are to be removed by appropriate policy changes, financial support and technical guidance. This calls for an integrated approach and endeavour on the part of both the central and state governments, implementing agencies, manufacturing companies and farmers.

- * The main policy should be so as to encourage and motivate all categories of farmers, since the critical issue is saving of water and augmentation of productivity.
- * The cost of the system should be brought down; otherwise, the subsidy component can be increased to all the farmers.
- * There should be separate department entrusted with the responsibility for popularising the system in the state governments and to avoid multiplicity of agencies.
- * The manufacturing companies should commit themselves for the supply of standard material and equipment conforming to BIS standards.
- * Farmers should develop conviction and confidence in the system.
- * The research institutions should integrate their activities with research and development units of the manufacturing companies. □

Pollution Of The Space

B.J. Alappat and A.K. Dikshit

Of all the different threats that can come from the space, the fall of meteorites is considered to be the most probable and the most dangerous one. There are thousands of asteroids and comets, which refuse to stay back in their orbits, but encroach into the orbit of earth.

POLLUTION HAS GROWN beyond the earth now. After the pollution of the land, the water and the atmosphere, now it is the turn of the upper atmosphere and the space. Human activities can damage the upper atmosphere and cause serious problems in the space near the earth. Thoughtless extensive rocket launching and artificial satellite/space probe programmes have left enough debris in the space to cause havoc to the present day space programmes. It has added to the thousands of space debris, which have been naturally occurring there making manned space programmes extremely difficult, costly and dangerous. There are other threats also which astronauts will have to face in space. For instance, though astronauts in the earth's orbit are protected from the galactic cosmic radiation by the earth's magnetic field, inter planetary voyagers run the risk of cancer and damage to the nervous system from the bombardment of iron nuclei and other heavy particles. Biological effects of these high-energy particles are not yet studied in detail at present.

On the one hand, human activities pollute the space and on the other, space pollutes the environment of the earth seriously. Asteroid/comet hit, gamma ray burst, high-energy radiation are some of the ways by which the space pollutes the earth. However, the pollution from space is not that common; but when it happens, it will be severe, sometimes causing even mass extinction of life.

Space Debris

This is the remnant of shattered rocket shells, satellites and spacecrafts,

abandoned satellites and probes, etc. along with the rock and other naturally occurring objects. It can cause havoc to the space missions.

According to reports, three decades of space programme has left about 35 million pieces of orbital debris. The space programmes of both former USSR and US are equally responsible for this. Objects of size more than 1 cm can cause catastrophic damage to the spacecraft. Even debris of size less than 1 cm can produce serious impact damage. It is reported that an aluminium sphere of diameter 0.125 cm, travelling through space at a speed of 22,000 miles/hr, will hit like a bullet from 0.22 cal. rifle.

It has been reported that about 1.5 lakh objects of size more than 1 cm are revolving round the earth. About 1,10,000 pieces are of the size range 1-10 cm. Of this, about 20,000 are actually larger than 5 cm. Since the Sputnik expedition (4th October 1957), there has been a leap in the space programme. Thousands of rockets have been sent up for atmospheric probe, launching satellites and spacecraft, etc. There are 2 main layers of the orbiting objects, one at 200-2000 km altitude (objects are of the size 10 to 30 cm) and the other at about 42,000 km altitude (objects are 1 m or more in size). Of these, about 6% are operational satellites and the rest are parts of rockets, spacecraft, satellites, etc.

These orbiting objects may hit the operating spacecraft or satellite with a velocity of 30,000-50,000 km/hr. This can cause serious damage depending upon the size and velocity of the hitting objects. There are instances of this debris becoming fatal. On 24th of July 1996, a French satellite Cerise was damaged by a fragment of an Arian rocket launched in 1986. The Russian satellite Kosmos-1275 is believed to have been destroyed by space debris. Also, during the installation of NASA's Hubble Space Telescope, space debris shattered the cockpit panel and an extra

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\$ 5 million had to be spent on the mission.

International Agency Space Debris Coordination Committee (IADC) has been formed to study and solve these problems. Mission of the Space Surveillance Network (SSN) is to track all man-made orbiting objects and to give information about the approaching debris. As it is very expensive to equip all the space shuttles with on-board debris spotting radar systems, NASA is depending on SSN. SSN spots the objects coming towards the shuttle at a distance of 1-1.5 miles and the shuttle performs the evasive manoeuvres. But at present, SSN can track objects of size more than 10 cm only. Actually, the particles of size more than 1 cm should be avoided. To achieve this goal, the sensitivity of the sensors should be increased by about hundred times.

Now a days, the satellites are being launched to the low-earth orbits (700-750 km from earth surface) bringing the danger down to us. The \$ 9 million Teledesic Space Programme, proposed by Microsoft and McCaw Cellular Communication, will be using 840 low earth orbit (LEO) satellites to function as an Internet in the sky. It is expected to take off early next century. Motorola is setting up a global mobile communication network with a constellation of 66 Iridium satellites in low earth orbits.

Rocket Exhaust

Solid propellant fueled rockets release toxic fumes during its course through the various zones of the atmosphere of the earth. It has been proved that rocket launching causes temporary depletion of the ozone off the stratosphere of the earth. Liquid propellant is less polluting than solid propellant. Russia has developed less polluting liquid propellant. India's GSLV (Geostationary Satellite Launching Vehicle) rockets will be using liquid propellants. Our all other rockets (SLV, ASLV and PSLV) are using the polluting solid propellants.

Recent discoveries revealed that earth's atmosphere has contracted by about 5 miles in the last 40 years. Thermosphere extends up to about 300 miles above the surface of the earth. In fact, it expands during daytime due to the sunlight and contracts at night. It has got some seasonal variations and some long-term variations also. But even after accounting for these fluctuations, thermosphere has shrunk by about 5 miles compared to the measurements of late 1950s. The reason is believed to be the global

Hilton International is planning to build a dome-shaped 5 star hotel "Lunar Hilton" on the moon. This hotel will have 5000 rooms with all facilities like park, zoo, playgrounds, church, etc.

warming. Cooling of the upper atmosphere was one of the widely predicted consequences of global warming.

Since the first human landed on the moon (1969), man has been thinking about colonizing the moon. It is going to materialize in the near future. Hilton International is planning to build a dome-shaped 5 star hotel "Lunar Hilton" on the moon. This hotel will have 5000 rooms with all facilities like park, zoo, playgrounds, church, etc. NASA may be involved in ferrying the passengers up and down. This may not be the only venture on the moon. At least three Japanese companies are planning to build hotels and colonies on the moon.

Pollution of the upper atmosphere of earth and the nearby space may not be as important as the pollution of water, air and land. But, because of the cost intensive nature of the present day space programmes and the potential dangers

to the proposed manned interplanetary space programme, space keeping is going to be important and the fight against space pollution will have to be intensified.

Presently, putting an object into the space costs about 1000 times the cost of flying it across countries by commercial planes, though both jobs need about the same amount of energy (about 10 kWh/kg of payload). There are attempts to make the space programmes less costly. Majority of the cost is for putting the satellite in the orbit. For instance, total cost of the Mars Pathfinder mission was about \$ 170 million, of which the cost of launching was about \$ 50 million. Many of the low cost techniques that are being developed now are actually less polluting.

To reduce the launch cost and pollution, there are many ideas and proposals under consideration now. One proposal is to go for new generation reusable launch vehicles. Lockheed Martin (a space contractor) is going ahead with this idea. Their "Ventura Star" may replace the space shuttle for ferrying cargo into the orbit. The target launch cost is about \$ 2,200/kg, which is only 1/10th of the cost of present space launch.

European Space Agency has proposed that during the major launches, Ariane rockets will carry many small satellites and space probes. An equipment bay has been designed for Ariane rockets to piggyback up to 8 satellites/space probes. A Mars probe can be designed to fit in the slot of Ariane and the probe would sit in the geostationary orbit until a window for a Mars flight opens up. A piggyback launch with the current Ariane rocket costs only about \$ 1 million.

New Launchers

Compressed gas powered propulsion of satellites into the orbit is another less polluting low cost technology under trial now. In Alaska, this new rocket launcher is being constructed to launch

the new generation communication satellites into the polar orbit.

An International Space Station (ISS) is going to be built about 500 km above the ground to serve as a launching pad for satellites. It is the largest scientific cooperation programme in the history, drawing resources and expertise from about 16 nations including Russia, Europe and USA. Two giant rivals of the cold war arms race, Boeing Co. of US and Khrunichev Aerospace Center of Russia, are jointly involved in this project. ISS will reduce the cost of satellite launching and the pollution caused near about space. It is expected to be ready by the year 2003.

NASA is developing magnetic levitation (maglev) technology that could reduce the cost of space programmes considerably. Like the high strength magnets that lift and propel the high-speed trains, maglev launch-assist system would electromagnetically drive a space vehicle. The magnetically levitated vehicle would catapult from the ground at about 1000 km/hr and then would shift over to a rocket engine to reach the orbit. Since the rocket is used after attaining some height, pollution to the near by space will be considerably less.

Pollution from Space

The space also plays a role in the pollution of earth and it can also pose serious threats to the life on earth. There are many ways, the pollution and threats reach the earth from space. It could be an asteroid or a comet or high energy radiation or a radioactive shower.

Many comets and asteroids fall on the earth. Many of them are small in size and they burn off in higher atmosphere before reaching the ground. But many are big enough to reach the surface of the earth. The fall of large comet or asteroid can turn to be dangerous for the life on earth. Many times in the past, the life was crushed under the striking asteroid/comet. Even now, earth is under the threat of these visitors. They are capable of polluting the whole of earth.

throwing up thousands of tons of debris, which will block the sun for even centuries. They can throw up enough sulphur to cause a haze of sulphuric acid. Usually they destroy thousands of acres of forest. They are ever capable of wiping off life from earth.

Even now, earth is under the threat of these visitors. They are capable of polluting the whole of earth throwing up thousands of tons of debris, which will block the sun for even centuries.

Of all the different threats that can come from the space, the fall of meteorites is considered to be the most probable and the most dangerous one. There are thousands of asteroids and comets, which refuse to stay back in their orbits, but encroach into the orbit of earth. NASA has estimated that, 1000 to 4000 asteroids cross earth's orbit and are larger than half a mile across.

Asteroid/Comet Hit

Comets revolve in fixed elongated orbits and reach even remote areas beyond the solar system. They visit us only once in a while. Usually they come from the Oort cloud—a giant cluster of rocks and gas somewhere beyond the far away planet Pluto. It is the birthplace and cemetery of many stars. Comets consist mostly of ices, gases and vapours such as solid nitrogen, carbon monoxide, methane, methyl alcohol, hydrogen ions, hydroxide ions, ammonia, hydrogen cyanide, etc. Comets are inert when they are away from sun. But near the sun, ice and other things sublime providing an explosive force to the comet. As a comet approaches the sun, all these become gases and form the long tail. Every comet has a straight plasma tail and a bent gas tail. Recently, it has been found that some of the compounds found in the tail of a comet will be transformed to Purine and Pyrimidine at high temperatures.

These are the basic compounds of all the living beings on the earth. So, many scientists believe that the comets brought life on to earth. It has been already proved that water on the earth was brought by comets only.

Majority of the heavenly visitors (meteorites or shooting stars) are asteroids. Asteroids do not have tails. They are usually rock or a cluster of debris. Asteroids can come from the solar system itself (from the Kuiper belt—a collection of rocks near the sun or from the asteroid belt between the planets Mars and Jupiter) or from outer space (mostly from the Oort cloud). In the solar system, the distances between most of the planets are equal, except that between Mars and Jupiter. The gap between these two planets is large enough to accommodate two planets. It is believed that once upon a time, the two were planets there and they collided with each other breaking into pieces. It is a fact that there are many rocks (some are as big as huge mountains) in that gap revolving around the sun. This asteroid belt is perhaps the main source of the asteroids that visit our planet.

• An XFII size (about 1 km wide) asteroid, travelling at a speed of 45,000 miles/hour will strike with an explosive force of about 5,00,000 Mega tons of TNT. Even a 2000 feet wide (<XF11) asteroid can produce an explosion powerful enough to level buildings and forest over 10,000 to 1 lakh square miles. A 7 feet object can produce a 1 kilo ton blast, the equivalent of igniting 1000 tons of TNT.

The Impact

Entry of the asteroid/comet and the impact will drill a tunnel through the atmosphere. A plume of vaporized and pulverized stone would blast up through this tunnel in the atmosphere. This would fall back to the earth raining pebbles, dust and even boulders. The impact would throw tons of sulphur into the air forming a haze of sulphuric acid shrouding the earth for many years. Sunrays will not reach earth's surface

and the earth will plunge into total darkness and subzero temperature for even centuries. An asteroid of just half a mile wide can throw up enough debris to the atmosphere to block out the sun for more than a year. The subzero temperature, darkness and polluted atmosphere can cause mass extinction of life on earth. If the hit takes place in ocean, it will create tsunami. An asteroid of size 1200 feet wide in Atlantic can create tsunami of over 300 feet high.

Earth is being constantly bombarded by interplanetary debris. On the average, a comet/asteroid of size more than 10 km strikes the earth roughly once in every 100 million years. Fall of a meteorite of 0.5 mile wide can happen once in 1 lakh years or so. Mass extinction of the life on earth has been occurring at about 26 million years interval.

There were many instances of asteroid/comet hit on the surface of earth in the past. At least four times during the last 600 million years, mass extinction has knocked the earth due to the heavenly visitors. The most severe killing took place about 250 million years ago. More than 95% of the living beings on the earth were wiped off. About 65 million years ago, a 5 mile wide asteroid hit the earth in the Yucatan Peninsula, near Mexico and wiped off more than 3/4th of life including dinosaurs. The force of that hit was about 10,000 times the explosive power of the global nuclear arsenals and it left a crater of diameter about 120 miles. Earth then plunged into subzero temperature and total darkness for thousands of years. Very recently, in June 1908, a 200 feet wide asteroid exploded 5 miles above Tunguska, Siberia with a force of 20 Mega tons. It destroyed forest of area of about 700 square mile.

Fighting Intruders

Scientists have designed a number of ways for the early detection of the dangerous objects coming towards the earth and for the destruction while they are far away from earth. Near Earth

Asteroid Tracking (NEAT) Programme is tracking all the asteroids that pass very close to the earth. Over the next 10 years, all these visitors will be tracked and earmarked. However, tracking comets is very difficult as they usually come from outside the solar system. Hence with comets, we may not get more than a few months warning.

Many proposals/ideas have come up to fight against these intruders. But not a single one is fool proof. The methods of interdiction involve vapourizing or pulverizing the intruder before it hits the earth, whereas the methods of Redirection depend on giving the intruder a new safe direction away from the earth.

Though deflecting the asteroid from its colliding path to some other safe path looks a better option, it may have to be

Scientists have designed a number of ways for the early detection of the dangerous objects coming towards the earth and for the destruction while they are far away from earth.

done sufficiently early so that it can accumulate a change of path of a couple of earth's radii. It has been estimated that an asteroid of 1 km size can be given a change of course of the order of about 1 m/sec. But such a small impulse will have to be applied at least many months before the expected strike. For example, a 4 mega ton stand off nuclear blast would give a 0.5 mile wide asteroid a velocity of 1.5 feet/sec without pulverizing it. This is enough to push it to a new safe path if it is used more than 5 months from hitting the earth.

The main problem with the Interdiction methods is that the fragments may fall on earth and that may be more harmful than a single hit. The Problem with the Redirection methods

is that the application of the push (to the new path) should be done sufficiently early so that the danger passes through far away from the earth. Many scientists are against the use of nuclear devices against the dangerous visitors. They say, a 1 Giga ton nuclear blast would pose a greater threat to the mankind than an errant piece of space rubble. The nuclear debris that may shower on to the earth emitting radiation can be fatal to the life on earth.

Other Threats

There are many more threats to the environment and the life on earth from the space, perhaps, not as dangerous as a meteorite hit. Gamma Ray Bursts (GRBs) are the mysterious flashes of high-energy radiation that appear in space. GRBs are distributed all over and can happen anywhere in the universe. Most of them occur far away from the earth and will not pose any significant threat to the life on earth. But should it occur near the earth, it could roast the green planet. A GRB (GRB 971214) was detected on 14th December, 1997 by BeppoSax—an orbiting gamma ray observatory. It had happened about 12 billion light years ($1 \text{ light year} = 34 \times 10^{11} \text{ km}$) ago. The explosion was so violent and powerful that had this GRB the 971214 happened within a few thousands of light years from the earth, it might have destroyed life on earth.

The dying stars with mass that of about 8 suns produce **Supernova** explosions. This is the best documented energy burst in the universe. Its total explosive energy is about 10^{51} ergs. No one can accurately predict when and where a supernova will explode. A few of the known candidates for supernova explosion are actually close to the earth. For instance, the red giant star Betelgeuse (at the shoulder of the Orion constellation) is ready to burst at any time and is only 430 light years away from us.

Cassini (the most expensive interplanetary probe ever assembled by NASA) began its 7 years, 3.2 billion km, *(Contd. on page 25)*

Community Liquid Waste: Applications In Aquaculture

Priyambada Patri

Sewage treatment plants of rapidly growing cities will become huge centers for food production and the reuse of organic waste from cities may eventually lead to the development of alternative agricultural systems that could surpass probably the contribution of the Green Revolution to the world's food production.

THE CONCENTRATION OF the human population in large cities is increasing at an alarming rate particularly during the past 150 years. Organic wastes (both domestic and industrial) emerging out of the above phenomenon has become a potential ecological problem. The sewage available in over 100 cities and towns of India is estimated at about 800 million gallons per day. The discharge of untreated sewage causes physical, chemical and biological damages to the natural environment. Thus the problem becomes multidimensional, especially when the developing countries are facing water scarcity due to industrialisation and urbanisation. Hence, recycling and management of these biological wastewater have become mandatory.

About 65 to 70 percent of wastewater is never subjected to any treatment and let into natural water bodies. As a result of the above, all the major rivers of India are significantly polluted and their waters are becoming unfit for human consumption without proper treatment due to high levels of biochemical oxygen demand (BOD_5), organic carbon, free carbon dioxide, ammonia (NH_3), hydrogen sulphide (H_2S), bacterial load, negative oxygen value and the high nutrient load. As we are aware, if the pollution is not too severe, in due course the river will recover due to its natural ability to purify itself. However, if the pollution is severe or if sewage enters at several points over a short distance, the self purifying power of the rivers is lost. Polluted water can spread epidemics as cholera, typhoid and dysentery. So, to

control eutrophication and epidemics outbreak and to meet the heavy demand of modern civilisation for potable water, treatment is indispensable.

Sewage and sludge are sources of N, P, K and micronutrients like B, Cu, Fe and Zn and also a source of organic matter, which can be recycled to meet the growing demand of food through agriculture and aquaculture. It has been estimated that about 90 t nitrogen, 32 t phosphorus and 55 t potassium valued at Rs. 61 million could be recovered from the country's domestic sewage of about 15,000 million litres daily. In order to meet the shortage of chemical fertilisers, the waste water could be recycled for the production of fish, paddy and vegetable crops.

Wastewater Treatment

Sewage treatment normally involves primary or physical, secondary or biological and tertiary or chemical phases. Physical treatment comprises (i) screening and filtration (ii) skimming and (iii) sedimentation. The biological treatment is related to a systematic use of the natural activity of bacteria for biochemical reactions resulting in the oxidation of organic matter into carbon dioxide, water, nitrogen oxides, sulphates, etc. Chemical treatment refers to coagulation or chemical precipitation, deodorisation and disinfection or sterilisation. The commonly used processes of treatment includes the conventional activated sludge and trickling filter system, oxidation/waste stabilisation ponds, aerated lagoons and various anaerobic treatment systems, the latest one being the Upflow Anaerobic Sludge Blanket (UASB) process.

Management is the key to proper biological wastes disposal. Modern and sophisticated technologies are coming up through research and development for large scale processing. In a typical sewage treatment plant, the sewage after precipitation, undergoes a slow anaerobic decomposition in which methanogenic bacteria play an important role. The soluble organic compounds in the supernatant liquid are mineralised under aerobic conditions. This is sometimes

achieved in a trickling filter system, where the waste liquid is sprayed on a bed of loosely packed rocks over which it trickles by gravity. In the activated sludge process, air is forced through the sewage and a floc or precipitate is formed, the particles of which contain actively oxidising microorganisms which grow utilising the nutrients in sewage. Several forms of waste stabilisation ponds, e.g., aerobic, anaerobic and facultative ponds, are effective in wastewater treatment. In the usual type of waste stabilisation ponds, the sewage is led into a relatively shallow pond of approximately 1.25 m depth with suitable inlet and outlet arrangements and having relatively a large capacity to give about 10 to 12 days retention time. The treatment process particularly during secondary phase depends on the effective use of bacteria for breakdown or stabilisation of organic matter and on the presence of algae for oxygen supply by photosynthesis.

Role of Aquaculture

In any sewage treatment process, the primary goal is to produce a final liquid effluent devoid of biologically important elements being restored/degraded to the inorganic state. Sewage treatment accordingly involves intensive operations of a substantial segment of the cycles of matter under more or less controlled conditions. The recent concerns of wastewater treatment through aquaculture systems constitutes an advantage over others because they provide healthy environment with high biodiversity. It has a large potential to ameliorate environmental problems. Wastewater aquaculture is broad in scope, for it involves a variety of microorganisms, organised production and treatment processes and wastewater recycling. It provides a simple and an effective alternative to conventional municipal systems for treatment and management of wastewater by reducing energy, operational and maintenance costs and the reuse of nutrients in the production of biomass as feedstuff could produce revenue to meet part of the operating cost. The major areas of wastewater aquaculture can be natural and artificial wetlands and highly structured integrated

systems, involving aquatic plants, aquatic invertebrates, finfish and microorganisms.

Aquatic macrophytes based treatment system

A large variety of aquatic vascular plants have been tested in order to assess their potential for use in improving wastewater treatment processes. The plants, viz., water hyacinth (*Eichhornia spp.*), *Typha latifolia*, *Potamogeton lucos*, *Ceratophyllum demersum*, water-lettuce (*Salvinia cuculata*) and water-ferns or duckweeds like *Lemna*, *Wolffia*, *Spirodela* and *Azolla spp.* have proved to facilitate wastewater treatment. Water hyacinth treatment system in warm or tropical climates is capable of producing advanced secondary effluents,

Management is the key to proper biological wastes disposal.

increasing nutrient removal and control of algae which may equal or exceed mechanical treatment systems. Cost, energy consumption, reliability and by-product utilisation were evaluated and compared with conventional techniques to arrive at such conclusion. Similarly, good removal of total suspended solids and BOD₅ were achieved with the duckweed culture. Several research findings have shown that these are good nutrient uptakers and thus improving the water quality. Their application enhances the sedimentation potential by formation of a mat which maintains the temperature in underlying water in a relatively stable condition. They also create an anaerobic environment which increases the bacterial decomposition rate, and more or less, the cover of weed on the surface restricts the growth of algal blooms and preclude mosquito breeding because the larvae would be prevented from surfacing for air. They are superior to water hyacinth as they can grow in low temperature during winter and monsoon, easy to process and comparatively higher biomass production and manorial value. The duckweeds raised in this system can further be utilised as feed for fish and others. It has been accepted they apart from stripping

nutrients and heavy metals also help in water amendments with respect to shortfalls in dissolved oxygen and pH.

Both natural and artificial wetland treatment systems represent an extremely attractive alternative to conventional secondary treatment. This advanced treatment of wastewater is fairly a recent innovation. The term wetlands is also a relatively new concept, encompassing what for years have simply been referred to as marshes, swamps, bogs and so on. Of late, great attention has been given to the use of wetlands, either natural or artificial for tertiary treatment of municipal wastewater, mainly to meet nutrient removal requirements. The use of artificial or constructed wetlands appears to have the greatest promise for general application because of greater reliability and process control.

Fish and shellfish based treatment system

Pisciculture in domestic wastewater is an age old practice in several countries wherein management cost involved are less. On the other hand, the use of fish for improvement of water quality is a novel approach. Fish have been assessed for their ability to improve wastewater in stabilisation ponds. Their incorporation reduces plankton and benthic populations. These changes improve the effectiveness of a wastewater pond on reducing BOD₅ and remaining nutrients from the water. Bacterial concentrations are also reduced, particularly the pathogenic ones. Omnivorous and bottom feeding fishes consume directly the suspended organic matters and detritus thereby indirectly helping to keep the pond aerobic. Several research findings have shown that stocking of phytophagous silver carp maintains positive oxygen balance in sewage fed ponds. *Tilapia* and air breathing fishes such as *Clarias batrachus*, *Anabas testudinius*, *Channa spp.* etc. are known to withstand a very low oxygen concentration and give better production in sewage-fed ponds. Indian major carps such as *Catla catla*, *Labeo rohita* and *Cirrhinus mrigala* and prawn are also reported to improve the quality of water.

Invertebrates and microorganisms based treatment system

More than 440 species of protozoans and worms are contributing to the biological treatment of sewage. Prawn and mussels are reported to remove heavy metals to a considerable amount. Microorganisms present in sewage play a major role in the biogeochemical cycling of nutrients and with the invertebrate action they become active during organic decomposition and a chain of events set-in that drastically alters the ecology. The specific use of microorganisms in the treatment of sewage effluents dates back to the earlier part of this century. Commercial preparations of bacteria and enzymes and their application in sewage improves the water and soil quality by enhancing nutrients removal, stimulating organic matter oxidation, reducing ammonia concentration, etc. Bacteria contribute for the removal of organic wastes especially available in dissolved form and facilitates denitrification by colonising on the surface of submerged plants.

Integrated system

For the economic use of land area and for the effective use of wastewater in urban and rural areas, several viable techniques have been evolved in different countries. Recycling of organic wastes through farming helps in improving environmental sanitation, social hygiene and better resource utilisation. Utilisation of wastewater for vegetables cultivation in fish pond dykes and elsewhere and also for paddy cultivation along with fish for which no inorganic fertilisers or compost manures is required has been in vogue. The wastewater alone could provide the nutrient demands as well as water requirements for the cultivars.

Present Status

Due to treatment effectiveness and the potential for cost and energy savings, aquacultural processes are being considered by several countries as favoured alternative to conventional wastewater treatment facilities. According to literature, Asian countries like China, Hong Kong, Thailand, Vietnam, Indonesia, Malaysia, Singapore, Japan, Sri Lanka and Taiwan, and other countries

like Israel, Peru, Germany, Czechoslovakia, Poland, Russia (CIS), USA, Kenya, Malawi, South Africa and Zimbabwe have sewage-fed aquaculture and sewage-wastes recycling systems.

India has been a leading country in the world in using sewage in large scale for various human economic benefits. In recent years, under the Ganga Action Plan of the Ministry of Environment and Forests of the Government of India, a series of sewage treatment plants are being set-up in cities located on the banks of the river Ganga. It is worthy to note that at Rahara, West Bengal a division of Central Institute of Freshwater Aquaculture (CIFA) has been functioning for the last several years to refine

Aquaculture seems to be one of the major avenues to convert biological productivity of wastewaters into protein-rich fish flesh.

aquaculture techniques using treated sewage. A 1 MLD pilot-scale aquaculture sewage-treatment plant (ASTP) has been set up at Cuttack, Orissa with the collaboration of CIFA, PHED, Orissa and NRCD employing duckweeds. Judicious utilisation and treatment of domestic sewage has been a part of the research work in many leading institutes like National Environmental Engineering Research Institute (NEERI), CIFA, Regional Research Laboratories (RRLs), Central Public Health Engineering Research Institute (CPHERI), Nagpur and other state public Health Engineering Department (PHEDs).

The constraints of sewage-fed aquaculture are related to environmental factors, such as (a) toxic substances in sewage, (b) depletion of dissolved oxygen due to higher organic material at higher temperature cause fish mortality, (c) lowering of photosynthetic activity through prolonged cloudy days causing oxygen tension which result in fish mortality, (d) microbiological infections

and the transmission of human pathogens like *E. coli* and *Salmonella* to fish and finally to human beings through handling and maintenance of the quality of aquaculture effluents discharge are other factors needing attention. It may be more pronounced when raw sewage having BOD₅ of more than 300 ppm is directly used in raising crops. Bioaccumulation of heavy metals in fish flesh, much likely, would biomagnify in the human consumers. Though sewage utilisation in aquaculture has certain inherent drawbacks as stated above, careful pretreatment measures could reduce the same. Aquaculturists, for the same reason, should be careful while selecting non-biological and biological agents for beneficiation/remediation. It may be noted here that, though many aquatic plants possess a greater ability to strip the noxious nutrients, there are standing rules from the Federal and State Governments prohibiting the use of certain species due to the menace they cause later.

Interdisciplinary

Environmental management is proper resource use and maintenance through sustainability. It is an interdisciplinary approach to resource conservation and recycling and it acts as a regulatory force on human excesses in resource exploitation. It is an endeavour to avoid the misuse of the resources in the environment. Aquaculture seems to be one of the major avenues to convert biological productivity of wastewaters into protein-rich fish flesh. Energy from plant biomass produced in this system may constitute an additional benefit of these processes. Sewage treatment plants of rapidly growing cities will become huge centers for food production and the reuse of organic waste from cities may eventually lead to the development of alternative agricultural systems that could surpass probably the contribution of the Green Revolution to the world's food production. According to International Reference Centre for Wastes Disposal (IRCWD), sewage reuse through aquaculture will become an increasingly important form of waste disposal, water pollution control and food production in the days to come. □

How To Cope With Job Stress?

S.S. Khanka

STRESS HAS BECOME a major concern of the times as it causes harm to employee's health and performance. Different psychologists and physiologists have defined stress differently. In nutshell, stress refers to pressures or tensions people feel in life. As living human makes constant demands, so it produces pressures i.e., stress. Stress is, therefore, a natural and unavoidable feature of human life. Hans Selye, the recognised father of stress research, views that stress is the spice of life, absence of stress is death. When stress is caused by good feelings, pleasant and happy events (for example, an employee is offered a job promotion at another place), it is called eustress.

Let us examine, the reasons for job stress. Any job condition can cause stress, depending upon an employee's reaction to it. For example, one employee will accept a new work procedure while another rejects it. However, the major job conditions that cause stress for employees are:

- i) Work overload
- ii) Time pressures
- iii) Poor quality of supervision
- iv) Insecure political climate
- v) Inadequate authority to match responsibilities
- vi) Role conflict and ambiguity
- vii) Change of any type, especially when it is major or unusual
- viii) Frustration

Conditions that tend to cause stress are called stressors.

Consequences of Job Stress

Stress is both a friend and a foe. Stress is not always damaging or bad. A mild stress may lead to increase in employee's job performance. People in certain jobs

such as newspaper journalists and television announcers who work under time pressures would seem to benefit from mild level of stress. Yet, the mild level of stress will vary from individual to individual. But, a high level of stress has three types of harmful consequences on employee's health and performance.

Stress has tremendous impact on physical health of the employees. A high level of stress is accompanied by high blood pressure and high level of cholesterol. It may lead to heart disease, ulcers and arthritis. Health care professionals are reporting that upto 90 per cent patients complain of stress related symptoms and disorders.

The symptoms of psychological consequences are anger, anxiety, depression, nervousness, irritability and tension. These psychological outcomes of stress, in turn, lead to lowering of self-esteem, resentment of supervision, inability to concentrate and make wrong decisions. These all boil down to poor job performance.

Stress, if sustained over a long period, also adversely affects the employees' behaviour. The consequences of stress on employees' behaviour reflected include overeating or undereating, sleeplessness, increased smoking and drinking and drug abuse. Employees may experience stress and react by getting drunk and staying home from work on the next day with hangover. They may eventually quit or be fired from the job. Research has proved that the employees suffering from job stress become less cooperative at home also. Stress, if continued beyond the abilities and capacities of employee to respond, leads to the physical and psychological exhaustion and possibly ultimate collapse. Stress is, therefore, considered as an 'invisible killer' also.

Stress is inevitable in human life. There is, therefore, no way out but to cope with stress or fight with it. There are two strategies that can help the employee to cope with stress. One is the coping strategies at the organisational level and the other is at employee level.

The strategies of organisation may reduce job stress of its employees. They are:

Stress is both a friend and a foe. A mild stress may lead to increase in employee's job performance while a high level of stress has harmful consequences.

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- i) Setting of clear objectives for the organisation so as to minimize job conflict and ambiguity among the employees.
- ii) Starting an organisation development (OD) department for creating meaningful and enriching jobs for its employees.
- iii) Having a flexible organisational structure so as to accommodate changing social, economic, political and technological developments.
- iv) Devising carefully plans for career paths and development taking into consideration both the individual capabilities and aspirations, on the one hand, and the organisational requirements, on the other. It is necessary because the stress is caused by not knowing what the next move is and how they are going to make it.

Employees' individual strategies are based on 'self-control' or 'do yourself' approach. These may include:

Physical exercise in any form, be it walking, jogging, swimming, riding bicycles or playing games help employees combat stress through relaxation, enhanced self-esteem and simply getting one's mind off the work for a while.

Self Management

Behavioral self-control or self-management is another method. It refers to a conscious analysis of the causes and consequences of employees own behaviour. In ultimate analysis, self-control strategy implies employees controlling the situation instead of letting the situation control them. Accordingly, one way to avoid stress is to avoid people or situations that will put employees under stress.

Employees need and benefit from social support is another aspect connected with this. For having social support, employees need to form close associations with trusted co-workers and colleagues who are good

listeners and confidence builders. Such alliance deliberately sought out and developed in the organisations is called 'networking'.

Last but no means is counselling. Last but no means least is counselling. One strategy to be used for coping with stress is giving counselling to the employees in the matters like career planning, to provide them clarity to their career goals and opportunities. This helps reduce uncertainty which is a major source of job stress.

Job stress impinges upon employee's health and performance. Hence, whether on an individual or an organisational level, steps need to be taken to prevent or reduce or cope with job stress. Nonetheless, self-help strategies adopted by employees have proved the most effective one to cope with stress. Sooner one starts self-help or self-control, better will be his/her coping with stress. □

(Pollution—contd. from page 20)

journey to the planet Saturn on 15th October 1997. As Saturn is far away from sun, the traditional solar panels cannot be used (panel area requirement will be very large). So 32 kg of Plutonium has been used in powered batteries to meet power requirements of Cassini. Cassini will sweep within 800 km of earth in 1999 for gravity assisted speed. Cassini uses gravity assistance from Venus, Earth and Jupiter to create a sort of sling shot effect that will accelerate it to the speed it needs to reach Saturn. Though, the Plutonium stock is well shielded and designed for accidents and the chances of Cassini reentering earth's atmosphere is less than 1 in 1 million. Antinuclear activists are scared of a Plutonium shower in 1999.

Solar Flares are the massive explosions on the surface of sun that occur in the vicinity of sunspots. Strong magnetic field exists around these spots and the solar flares occur when the magnetic field suddenly unleashes magnetic energy. The ultraviolet rays, X-rays and other radio waves released at that time disturb earth's ionosphere disrupting the shortwave radio communication. On 27th August 1998, for about 5 minutes,

X-rays and other radiation from a distant magnetar caused temporary but major alteration of the electrical activity of the ionosphere of the earth damaging radio communication. Magnetar is a kind of neutron star made up entirely of neutrons tightly packed in about 30,000 km diameter. X-ray beam emanates from its surface.

After the Challenger tragedy of 1986 where 7 astronauts were killed, US space programme slowed down. But now it is picking up again because of the latest low cost technologies. The cost of space programmes has been brought down considerably in the recent years. For instance, the cost of Viking (1976) was about \$ 3000 million whereas that of Mars Pathfinder and Sojourner was \$ 170 million. Efforts are under way to make it more and more economical and less polluting.

But, the threats from the space debris are on the increase now. Other than the rocket shells and the naturally occurring debris, many of the operating satellites and probes are going to be abandoned or lost to add on to the chaos. For instance, the 1 billion dollar solar and heliospheric observatory (SOHO), launched in

December 1995 to study about the sun and its interaction with earth, lost its contact with the ground control and is lost now.

In spite of all difficulties, space programmes are going on in full swing. Galileo spacecraft reached Jupiter's orbit 2 years back. It is studying the atmosphere of Jupiter and its satellites Europa (the one that is similar to the earth with a surface covered with ice/water) and Io (geologically and geophysically most active body in the solar system). Mars pathfinder landed on Mars on 4th July, 1997 and the Sojourner (a six wheeled robot) analyzed rocks on the surface of Mars. Mars global surveyor reached the planet on 11th September, 1997 in search of the seeds of life there. Japan's first Mars probe Planet-B, launched in July, 1998, will enter the Martian atmosphere in October 1999. Magellan spacecraft is orbiting Venus now. The user manned mission to Mars has been planned to take off in the year 2011. The space programmes will be on the increase, for sure. It is required that there be some check on the space debris and the pollution of the upper atmosphere. Of course, pollution that comes from the space is difficult to be controlled. □

STRIDING TOWARD

PETROLEUM AND NATURAL GAS

TO make available to the consumers quality products at competitive prices, the phased dismantling of APM began on 1st April, 1998.

Refining Sector has been delicensed. The 1998-99 budget introduced a 5 year tax holiday for new refineries to be set up after 1st October, 1998. In July, Government allowed private and joint sector refineries to import crude oil for actual use in their refineries.

Production Sharing Contracts (PSCs) for 13 exploration blocks were signed which were pending for a long time. These blocks cover an area of over 45,000 sq. kms.

To improve the atmospheric environment, only unleaded petrol (ULP) is being supplied in Delhi w.e.f. 1st September, '98. ULP has been introduced from June 1, 1998 in all other metropolitan cities and major towns.

To give boost to the infrastructure, a cess of Re. 1 per litre on petrol was introduced through Budget 1998-99 to form a corpus of Rs. 790 crore which will be used for development of National Highways.

FERTILIZERS

THE availability of fertilizers has been comfortable during Kharif 1998 and no reports of shortages were received during Rabi so far. The urea availability at 57.06 lakh tonnes was satisfactory.

RAILWAYS

NEWLY completed 760 kms Konkan Railways dedicated to the nation in May 1998. It connects Maharashtra, Goa, Karnataka and Kerala on West Coast.

Tatkal Booking facility have been extended to all 81 major trains.

Senior citizens have been allowed a

concession of 30 per cent in all classes in all trains, as against 25 per cent available before in Second Class only.

Unemployed youths attending interviews for selection to Central Government jobs were given full concession in Second Class on production of certified copy of call letter and application.

MINES

SPECIAL drive launched for expeditious disposal of states for grant of mining leases. 256 cases disposed of during April to November, 1998.

Twelve proposals of Foreign Direct Investment of about Rs. 474 crore in the mining sector were cleared.

STEEL

National Mineral Corporation Ltd. (NMDC) to take up the exploration of gold and other minerals in Madagascar.

WATER RESOURCES

A scheme has been taken up to utilise ground water in the eastern region with an outlay of Rs. 6.95 crore in 1998-99.

Annual replenishable ground water resource has been firmed up at 64.05 million hectares.

Andhra Pradesh Economic Restructuring Project negotiated with World Bank has been approved by the Bank. The Project has an outlay US \$ 142 million under the irrigation component.

A sum of Rs. 1,500 crore has been earmarked for the state governments as assistance under the Accelerated Irrigated Benefits Programme during 1998-99 to accelerate the implementation of large irrigation projects which have spilled over from one plan to another mainly because of financial constraints of the state governments.

Andhra Pradesh Economic Restructuring Project negotiated with

World Bank has been approved by the Bank. The Project has an outlay US \$ 142 million under the irrigation component.

SOCIAL JUSTICE AND EMPOWERMENT

THE National Handicapped Finance and Development Corporation was reactivated and it has begun financing self-employment projects for disabled persons.

The Ministry is in the process of finalising a comprehensive National Policy on Rehabilitation of Disabled Persons.

The Ministry has given ad-hoc advance of Rs. 5 crore (Rs. 50 million) to states to encourage inter-caste marriages for the first time during 1998.

EDUCATION & CHILD WELFARE

DEPARTMENT of Education proposes to make education free for all girls up to college level, including professional course.

It covers girls students who are enrolled in Government and Government aided school/colleges including professional level, Indira Gandhi National Open University/ National Open School.

A National Commission for Children will be set up soon.

URBAN AFFAIRS AND EMPLOYMENT

HOUSING was granted an infrastructure status under section 80 IA of the Income Tax Act, 1961 during 1998-99.

A new Housing and Habitat Policy, 1998 was announced. It provided for active public-private partnership in national housing. It gives the private sector primacy over government agencies and limits the Government's role as a facilitator.

DEVELOPED INDIA

The new Housing & Habitat Policy envisages building of 20 lakh houses annually—7 lakh in urban areas and 13 lakh in rural areas.

An Action Plan for construction of 2 million houses for the weaker sections and low income groups has been finalised and circulated to states.

Rent control legislation has been amended to stimulate investment in rental housing and exclude new construction from rent control.

Investment from NRIs & Persons of Indian Origin as also FDI are being encouraged in housing and real estate infrastructure sector.

The Government is working out a National Slum Development Policy in the area of urban poverty alleviation.

COAL

THE year saw an unprecedented build up of coal stocks at power stations served by Coal India, the aggregate stocks being 15.30 m.t. as on Dec. 8, 1998.

Coal and Lignite products have been delicensed. Moves are on to amend the Coal Mines (Nationalisation) Act, 1973 to allow exploitation of raw coal and lignite reserves by both private and public sector organizations without the existing restriction on capture consumption.

World Bank and Exim Bank of Japan are providing US \$ 530 million each under the Coal Sector Rehabilitation Project of CIL. 24 mines of 5 subsidiaries of CIL will be benefitted under this project.

The two mines of Neyveli lignite Corporation put together have crossed 100% mark in respect of capacity utilization for over burden removal and lignite excavation.

A new pension scheme benefitting 8 lakh coal employees was notified in March 1998.

FOOD AND CONSUMER AFFAIRS

THE thrust of the activities was on smooth running of the targetted Public Distribution System, maintaining comfortable buffer stock in the central pool and construction of adequate storage facility for foodgrains.

Wheat procurement during the Rabi season 1998-99 touched an all time high of 12.6 million tonnes.

The buffer stock norms have been revised based on the comfortable foodgrains stock position at the centre, with effect from September, 1998.

Sugar industry has been delicensed, state governments have been authorised to increase the stock holding limit and the turn over period of recognised dealers of sugar and khandsari.

The Ministry's steering committee on improved storage of foodgrains has suggested setting up of bulk storage installations and community silos.

The basic customs duty on edible oils on OGL have been reduced from 20% to 10% while retaining the surcharge of 5% on imports. This is expected to reduce the landed cost of oil by around Rs. 3000 per tonne.

Edible Oil Packaging (Regulation) Order was promulgated under the Essential Commodities Act on September 17, 1998, making it mandatory to sell oil only in packaged form so as to prevent adulteration.

TOURISM

TOURISM gets full pledged ministry status.

Export House incentives being given to tourism establishments.

Tourism emerged as one of the largest foreign exchange earning sector by mopping up foreign exchange of Rs. 10363.29 crore from January—November, 1998.

60% hike has been made in the Plan budget for 1998-99 to improve facilities for domestic tourism.

Buddha festival organised at Sarnath and Bodh Gaya in Oct-Nov attracted many tourists from South Asian countries.

March, 1999 to April, 2000 has been declared as 'Visit India Year'.

The first ever tourism exposition was organised in Jan '98 to project the opportunity and potential of Indian tourism.

LAW, JUSTICE AND COMPANY AFFAIRS

AN ordinance was promulgated to amend the Companies Act, 1956, allowing companies to buy-back their own shares and make intercorporate investments/loan without Government's approval.

About 66.28 lakh pending cases were settled through 22,452 Lok Adalats held in different parts of the country.

A high powered committee has been constituted to suggest proposals for providing state funding to recognise political parties and other related matters.

INFORMATION AND BROADCASTING

PPRIVATE Indian satellite channels were allowed uplinking facilities from Indian soil on a case by case basis.

Films have been granted industry status. A Development Committee has been set up for the film industry and an Export Promotion Forum has been constituted to boost export of films, TV software, music and other audio visual entertainment products.

On August 29, 1998, Prasar Bharati (Broadcasting Corporation of India) Ordinance, 1998 was promulgated to restore the provisions of the original Prasar Bharati Act, 1990.

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Mormugao : Widening Frontier

V.K. Abdulla

IT WAS ONLY around 1543AD, more than 30 years after Afonso de Albuquerque, made his trail blazing arrival in the small coastal town of Old Goa, that Mormugao became part of the Portuguese conquests. With old Goa's fortuitous position establishing it as an entrepot for flourishing trade, it soon became the capital of Portuguese territories in India. In fact, even before the advent of the Portuguese, old Goa had cultivated an exotic, cosmopolitan ambience. Merchants of both western and eastern countries colourfully dressed in their native costumes, moved around regally in ostentatious palanquins as they engaged in the trade of much coveted Indian spices, muslins, horses, coconuts, bamboos, wood and precious stones. The Portuguese on their arrival did not lag behind in cashing in on this vibrant commercial hub. Their 'Correira da India' consisting of elegant sturdy sailing vessels called 'Caravelas' plied between Goa and Lisbon, flooding the European markets with a variety of oriental goods coveted by them.

Mormugao occupies a prominent position as India's premier iron ore handling port. Upto 15 million tonnes of ore are exported through this port each year to various countries.

The "Key to the whole India", as Mormugao was then known was blessed with an enviable geographical position. Two hills with extended headlands served as bastions of defence, while its sheltered basins made it a natural and safe harbour permitting easy access to the sea. However, it was only a century later, with the decay of the "City of Goa" and the innumerable attacks by the Marathas on the land, that the strategic potential of Mormugao was really understood. A central location, an expanse of level land and above all, the situation of the peninsula around a magnificent bay made it an attractive site for the new city.

In the meantime, the canny British systematically built up a network of railway lines, passing through the rich agricultural lands of British India, connecting the harbours to the commercial and industrial centres. The port of Mumbai, quixotically gifted away by the Portuguese to the British, was catapulted into a premier position, serving as the nearest exit point for goods from southern and central India. Thus, detached and isolated from the rest of the country, Goa wilted and languished on a floundering economy.

Key to Economy

Awakening to the gravity of the situation, and realising that Mormugao was the key to the economy of Goa, the Portuguese set about initiating the processes towards the construction of a railway line linking the port of Mormugao to the network of British railway lines. Not unexpectedly, they were strongly discouraged by the British who saw in Mormugao a potential threat to Mumbai harbour. However, the Portuguese prevailed upon the British Government and reached a settlement with them on the construction of the Mormugao railway line paying a heavy price like high rate of interest, surrender of trade monopoly, etc.

In 1882, work commenced on the construction of the railway and the port of Mormugao. By 1887, 41 miles of the railway line in Portuguese territory known as West of India Portuguese Guaranteed Railway (WIPR) was inaugurated by the Portuguese Governor General. And in 1885, even before the work of the breakwater was complete, the S.S. Westbourne, a vessel with 25 feet draft, sailed into Mormugao unloading her cargo at the new quay.

1888 began on a note of hope with the commissioning of the entire railway line from Mormugao upto Castle Rock, the frontier of British India. The linking of the railway lines catalysed a dynamic and vibrant intercourse between British and Portuguese India.

Soon after its commissioning, Mormugao once again emerged as a

prominent transit port for Bombay, handling goods from the vast districts covered by the Madras and Southern Maratha (M&SM) Railway. The hectic activities of the port breathed new life into the city of Vasco da Gama as commercial and navigational agencies along with the industries inherent to the working of a port began mushrooming, fuelling the hopes and aspirations of Goa's people.

Ironically enough, its success was the very breeding ground of its nemesis. For threatened by the emergence of Mormugao port and railway, British India Railway Companies commenced a merciless war of under cutting with the WIPR. Without a large area of operations to sustain, the WIPR soon found itself on the brink of financial disaster. Being left with no alternative the Portuguese handed over the working and administration of Mormugao port and railway to the M&SM on terms and conditions entirely favourable to the latter. Thus, the Portugal's "Pearl of the Orient" had fallen upon dismal times. Trade and commerce in Goa were virtually non-existent most of it having been captured by the Port of Bombay.

However, under the management of the M&SM Railway, Mormugao did derive some benefits. Part of the M&SM traffic via Poona was diverted to the Mormugao Railway line which brought about some improvement in the position of Mormugao. The harbour too saw increased movement of traffic. In fact in 1904, the M&SM Railway signed a contract with the shipping firm F.C. Strict & Company, seeking to establish a monthly direct shipping service between Europe and Mormugao, touching Lisbon in order to raise Mormugao's volume of traffic. A silver ray came shining through in 1927, when the railway line from Secunderabad to Gadag was connected with the M&SM Railway. This route was much utilised by the rich and prosperous state of Hyderabad to transport all her agricultural and industrial products and the port of Mormugao welcomed into its sheltered bay large foreign ships plying directly to Europe.

Riverberaftions

The riverberations of India's independence in 1947 had their impact on Mormugao. Unlike the British who bowed out gracefully from India, the Portuguese clung on tenaciously to the flickering remnants of their former colonial glory.

For fourteen years, the Indian Government tried in vain to persuade the Portuguese to give up their little corner of India amicably, held in a strait jacket by the dictatorial regime of Dr. Antonio Oliveria Salazar. However, the

Isolated from the rest of the country, Mormugao could not build itself up as a general cargo port during the Portuguese regime. It, therefore, concentrated on mineral ore to sustain it.

uncompromising attitude of the Portuguese made a military takeover inevitable. In fact, the last the Portuguese Governor General, Vassalo de Silva, had orders to fight till the bitter end regardless of the cost. It was only his practical and humane attitude that made the liberation of Goa a generally peaceful process.

Meanwhile, determined to win Goa back into the national fold, the Government of India severed diplomatic relations with the Portuguese in 1955. Consequently, the running of the Railway line was handed back to the WIPR at the end of that year. Along with the M&SM, 700 employees of Mormugao Port and Railway left Goa. It was only by using enhanced salaries as bait to recruit retired staff that the port and railway were kept functional.

It was a dismal scenario all round. As the economic blockade imposed by India sealed all exits, the traffic of Mormugao Port was restricted within the limits of Goa. This led to the metamorphosis of

the port from a transit port into an export-import oriented port, handling not only exports of Goan iron ore, but imports of general cargo, so very essential for the survival of Goa during those isolated times. While traffic at the port showed a marked upward trend the railway did not accrue much benefit as most of the iron ore was transported by barges via waterways.

At the time of its commissioning in 1888, the Mormugao Port comprised 3 berths along with a breakwater of length 358 metres. As the years rolled by, the infrastructure slowly kept growing. By 1922, Berths 4 and 5 were built and the breakwater was extended to its present length of 522.40 metres. A mole of 270 metres was also added.

Isolated from the rest of the country, Mormugao could not build itself up as a general cargo port during the Portuguese regime. It, therefore, concentrated on mineral ore to sustain it.

With the emergence of mining as a major industry in Goa, a Master Plan was evolved by the Portuguese for the development of Mormugao Port as an iron ore terminal, envisaging "dedicated berths fitted with mechanical ore loading plants, provided and financed by various iron ore exporters." In accordance with this, in 1959, Chowgule & Co. Pvt. Ltd., were permitted to set up Asia's very first mechanical ore handling plant at berth no. 6 with a capacity of 1000 tonnes per hour (tph). Berth 7 was constructed as an adjunct to it.

The liberation of Goa on December 19, 1961 marked the end of an epoch in Goan history. A history that had for four and a half centuries been closely entwined with the Portuguese. It also marked the dawning of a new era that saw the people of Goa come into their own as masters of the future. A union territory till 1987, Goa became the 25th state of the Indian Union, thereafter.

Mormugao port too, went through a fair amount of change as the emphasis

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Environmental Pollutants And Immune System

Nandita Shukla and Mahendra Pandey

An increase in infectious diseases among humans as well as various wildlife populations has been partly attributed to exposure to environmental pollutants. The origin of the infectious diseases depends on the reactivity of the human body, the quality and quantity of the causative agent, and the influence of the external environment and social conditions.

IT IS WELL established that each individual has an intrinsic capacity to defend itself against pathogens in the environment with a defence known as the immune system. This system serves the body by neutralising, inactivating or eliminating potentially pathogenic invaders such as microorganisms (bacteria and viruses) it also guards against uncontrolled growth of cells into neoplasms or tumours. The reactivity of the human body with its immunobiological readiness to render the pathogenic microorganisms harmless is closely related with the environment, with conditions of life, nature of work and nutrition, hygienic and general cultural level and many other factors.

The condition of the microorganism and its resistance have a decisive significance in the origin, course and outcome of the infectious diseases. Susceptibility depends to a certain extent, on age and sex due to certain physiological peculiarities. For example, during menstruation, pregnancy and labour women become more sensitive, particularly to streptococcal diseases. Children are more susceptible to some infectious diseases, and less susceptible to some other. Resistance to many infectious diseases in children up to the age of 6 months is associated with a poorly developed central nervous system, and also with the presence of maternal immunity.

An increase in infectious diseases among humans as well as various wildlife populations has been partly attributed to exposure to environmental pollutants. The origin of the infectious diseases depends

on the reactivity of the human body, the quality and quantity of the causative agent, and the influence of the external environment and social conditions. Depending on the relationship of these factors, the infectious processes may terminate in the death of the causative agent, the death of the host or the establishment of mutual adaptation between the host and the parasite. Such infections can be secondary to other conditions, such as favourable environment. But the infections can also be induced by environmental chemicals.

The immune system, on which defence mechanisms depend, is a potential target for many foreign chemicals to the body. It is reported that in experimental animals, effects of chemicals on the immune system may show up as changes in weight and appearance of lymphoid organs (such as thymus, spleen and lymph nodes), in altered numbers of blood leukocytes, and in the impairment of immune cell functions. Such toxicity may result in an increased incidence of infectious diseases or in the development of certain systems.

Consequences

Although many chemicals are known to be immunotoxic in animals, relatively little is known about the consequences in humans. According to a study, some persons were poisoned in Taiwan (1979) by the consumption of rice oil accidentally contaminated with polychlorobiphenyls (PCBs) and polychlorinated dibenzofurans (PCDFs) and suffered from skin lesions, liver damage and an altered immune function. Other epidemiological observations suggested that exposure to air pollutants is linked with increased susceptibility to infections.

The body has various barriers as a defence against infectious microbial agents (viruses, bacteria, fungi and parasites). Examples of physical and biochemical defences are intact skin and the barrier formed by ciliated cells and the mucous layer over them in the upper airways. In addition to these, the body is also protected by the immune system.

PCBs, dioxins and certain alkyltins have been identified as immunotoxic

environmental chemicals. The most potent immunotoxic chemical appeared to be the environmental contaminants; hexachlorobenzene (HCB) and tributyltin oxide (TBTO). It is reported that HCB, without altering body weight, significantly increases the number of monocytes in the peripheral blood and serum IgM concentrations. It also increases the weight of spleen, weight of mesenteric and popliteal lymph nodes. These alterations are indications of an immune stimulatory effect of HCB.

Some compounds can exert a direct toxic action on the immune systems as well as altering the immune response. Heavy metals like lead and mercury, manifest immunosuppressive activity,

Some compounds can exert a direct toxic action on the immune systems as well as altering the immune response.

hypersensitivity and autoimmunity. A number of substances affect immunological parameters. These include halogenated hydrocarbons such as polychlorinated biphenyls, polybrominated biphenyls, polychlorinated dibenzo-paradoxins, polychlorinated dibenzofurans, pesticides, organic solvents, asbestos, silica and metals like lead and oxidant air pollutants in airborne dust may affect immune functions. Humans are exposed to environmental contaminants mainly via food, water and air. Open water (rivers, lakes and coastal areas) and sediments often act as sink for environmental pollution.

Whatever be the primary cause of the immune deficiency, patients develop more frequent, severe, recurring, typical infections depending on the type and severity of the deficiency. The complications associated with severe immuno-suppression include bacterial, viral, fungal and parasitic infections. The pathogens most frequently encountered in immunodeficient patients include the bacterial agents *Staphylococcus aureus*, *Streptococci*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Listeria monocytogenes*, *Mycobacterium tuberculosis* and atypical mycobacteria. *Herpes virus*, *Cytomegalovirus*, *Epstein Barr virus* and human papillomavirus are the leading causes of viral infections in immunosuppressed patients. Fungal opportunistic infections include those induced by *Candida*, *Aspergillus* and *Cryptococcus* species. The immunotoxicity induced by environmental chemicals often results in subtle changes in the immune systems, which have been suggested to result in increased incidences of common infections like influenza and the common cold.

The respiratory tract is a primary target for infectious pathogens, especially in immunosuppressed patients. Pulmonary infections and infections of the upper respiratory tract are the most common. *Cytomegalovirus* infections are particularly frequent in renal transplant patients. In addition, *Pneumocystis carinii* can cause a particular form of pneumonia in immunosuppressed patients. Even though respiratory diseases usually predominate gastrointestinal infectious diseases may constitute the leading consequences of immunosuppressions. Infections of the central nervous system and isolated fever are also extremely frequent. The type of infections that develop in immunosuppressed patients is largely dependent on the type of immune defect. A number of adverse effects have been reported after treatment with immunostimulating drugs, including influenza-like reactions, facilitation of underlying diseases and inhibitions of hepatic drug metabolism.

Patients with influenza-like reactions present with mild to moderate fever associated with chills, malaise and hypotensions. The reactions usually develop within hours after taking an immunostimulating drug and the patient recovers uneventually within a few hours. Such reactions are relatively uncommon with most immunomodulating agents but have been shown to limit treatment with several recombinant cytokines.

Exposure to asbestos is associated with the development of inflammatory, fibrotic and malignant diseases in humans. A number of observations indicate that immune processes influence the development and resolution of both the inflammatory response and fibrotic lesions. For example, exposure to asbestos is associated with alterations in cellular and hormonal-mediated immunity including reduction of lymphocyte mitogenesis delayed hypersensitivity responses and primary antibody responses. Oxidant gases have been associated with an increased prevalence of respiratory infections, particularly bacterial and potential immune effect. A number of studies have linked exposure to air pollutants (ozone, nitrogen dioxide, sulphur dioxide and environmental tobacco smoke) with an increased incidence, severity or duration of symptom associated with respiratory infections.

Observations have shown that sunlight has a favourable effect on the organism, and to a certain degree increases the resistance to infectious diseases. However,

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in a number of cases, lengthy and intense irradiation is accompanied by a decrease in the resistance of the human organism to a number of pathogenic microbes. Of great theoretical and practical importance is the action of ionizing radiation. As has been established small doses of X-rays increase the resistance to various diseases, while increased doses lower it and enhance the activity of normal microflora and development of bacteraemia and septicaemia. At the same time the permeability of mucous membrane is disturbed, their barrier capacity is reduced, and the function of the reticuloendothelial system and defence properties of the blood are sharply

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Soil Solarization: A Boon To Farmers

A. Jagadeesh

Soil solarization is a refinement of the mulching process that had its origins in early agriculture. Traditionally, a covering of organic or inorganic materials was used to protect soil against frost or to make it increase plant growth.

SOIL SOLARIZATION IS a simple, cheap and highly effective method of controlling plant diseases and weeds and environmental poisoning.

Soil solarization method, pioneered by Israeli scientists in the mid 70s, harnesses two benign and inexhaustible resources to kill pathogens: the sun's rays and moisture. The only priced input needed is—ironically—plastic sheeting, a tool for preventing serious pollution caused by herbicides and pesticides.

Besides saving soil from weeds and micro-organisms the solarization process has a number of beneficial side effects like altering some of the chemical and physical properties of soil to promote better crop yield. Unlike fumigation, it does not kill the soilborne bacteria and mycorrhizal fungi that are essential to stimulate plant growth and development. It improves soil tilth, nutrition, aeration and water movement, making less irrigation necessary. What is more, all these effects are long lasting.

Soil solarization is a refinement of the mulching process that had its origins in early agriculture. Traditionally, a covering of organic or inorganic materials was used to protect soil against frost or to make it increase plant growth. Mulching also served to limit water evaporation from soil, control weeds, improve tilth and manage erosion. With the advent of plastic, black polyethylene film has been employed as a mulch to warm the soil to increase seed germination and plant growth during late winter or early spring months.

The success of soil solarization is based on the fact that most plant

pathogens and pests are mesophylls, usually killed when subjected to temperatures of 37°C and above for extended time periods. Thermotolerant and thermophylic soil borne organisms usually survive the solarization process.

Soil solarization improves soil nutrition, aeration and water movement ... and the effects are long lasting.

Another important principle in post-plant solarization is that soil temperatures do not need to reach lethal doses to control plant disease as long as they reach temperatures that stop the growth, development or establishment of pathogenic organisms. If the pathogens, though living, are unable to grow, they will not infect root tissues or cause disease.

The process of soil solarization is hydrothermal, requiring moisture for maximum heat transfer to soil borne organisms. The effect of heat on soil borne organisms depends on both the soil temperatures and the exposure time, which are inversely related—the higher the temperature the less time is needed.

To solarize soil, it must be kept moist and kept covered with a sheet of plastic, usually polyethylene, for four to six weeks during the dry seasons in tropical countries like ours. The sheeting should be stretched tightly and the edges buried in soil to hold the plastic in place. Solar radiation quickly heats the soil under the plastic, which conserves both heat and moisture.

There is no doubt that soil solarization could be of incalculable value in countries like ours, where the cost of herbicides and pesticides is prohibitive for small holders, but where weeds and plant pathogens destroy billions of rupees worth of produce every year. □

Women And Food Security

N.G. Hegde

Enhancing capabilities of farm women to use improved techniques will not only help in increasing production, but also in reducing their strain and time spent on farming activities.

REALISING THE SCOPE for empowering rural women in the above activities, BAIF Development Research Foundation, a voluntary research organisation involved in sustainable management of natural resources and poverty alleviation has introduced several field activities to empower rural women. The results are very encouraging and deserve replication on a wider scale.

Improving Skills

The rural women acquire necessary skills for various agricultural operations by observing others in the field. However, over the years, various new techniques have been introduced to reduce the manual labour and to use different external inputs to enhance the productivity. There are a wide range of agricultural implements used for tilling, weeding, planting, intercultivation, pest-control, harvesting, threshing, cleaning, drying, etc. With the introduction of any new technology, it is mostly the male members, who get the opportunity to undertake training and make optimum use while the women generally have to learn from other users. In fact many societies do not consider women to have any place in operating machines or even motorised implements and tools. The time has now come to change this situation. Equal opportunity must be given to women to participate in trainings and they should be encouraged to make use of all the tools. The scientists and technicians involved in developing new techniques and tools should also be oriented to design such tools which can be easily operated by women.

Enhancing the capabilities of farm women to use improved techniques will not only help in increasing the production, but also in reducing their strain and time spent on farming activities. Training of women in judicious and appropriate use of agro-chemicals at proper stages of crop growth would further lower the cost of production and reduce environmental pollution, while increasing the yields.

Our experience in high input agriculture to enhance the production has indicated that all is not well. While elite farmers, who manage their farms scientifically were able to optimise the use of inputs like improved varieties, irrigation and agro-chemicals for economic crop production, a large number of small holders have ended up with miserable failures. There are several examples, where farmers have lost their soil productivity and crop yields due to excessive use of water for irrigating their crops. Use of fertilizers in small or higher doses and at inappropriate times have resulted in either failure or higher cost of production. Improper use of agro-chemicals, particularly crops like cotton has forced thousands of farmers to lose their crops. Unable to repay the debts, hundreds of cotton farmers committed suicide in the recent past. This reconfirms that intensive use of external inputs may not be sustainable under all situations.

It has been observed that in case of small farmers, particularly in backward areas or in arid zones, it is necessary to encourage them to build up their farming operations gradually with marginal use of external inputs. Use of improved varieties of farmyard manure, composts and vermicomposts, green manure and biofertilizers can significantly enhance the production in backward area where agriculture is under gross neglect. Similarly, the use of biopesticides as a part of integrated pest management can not only reduce the cost of crop production, but also protect the crops more effectively.

During the recent past, BAIF has been encouraging rural women to take up vermicompost production not only to

boost their crop production, but also as an income generation activity. Even in backward areas of Uttar Pradesh, BAIF has encouraged the landless women to form self help groups and collect dung and agricultural wastes from community fields and forests for vermicompost production. While these women are able to generate substantial income, the farmers who buy the vermicompost are

BAIF has been encouraging rural women to take up vermicompost production not only to boost their crop production, but also as an income generation activity.

able to improve their soil-productivity and crop yields. An interesting case study of Mrs. Jugra Devi, a landless woman belonging to scheduled caste from Bijemau village in Pratapgarh district of Uttar Pradesh, reveals that vermicomposting can be a good opportunity for the landless to sustain their livelihood.

Engaged as daily labourers, it was difficult for her husband and her to make both ends meet. The BAIF team decided to train her in vermicomposting. She was paid Rs. 5 per kg for the 24 kg of vermicompost produced at her backyard. She earned Rs. 304 by harvesting 76 kg of vermicompost from the second cycle.

She realised that the limiting factor in her case was cowdung. To augment the supply of cowdung, she purchased a nondescript cow and a calf for Rs. 200. A changed personality, Jugra Devi has formed a group of 22 women who have been trained by her and supplied worms to start their own vermipits. These women have formed their own self help groups and internal lending has commenced. Besides this, the cow is being given regular nutritional support with BAIF's help to enable her to go into oestrus synchronisation and get artificially inseminated. With all this

windfall, within a short period of one year, Jugra has cleared all outstanding loans and has started sending her children to school. She has also gained official recognition through district officials visiting her site to learn more about vermicomposting. She now guides other women in her community in spite of being landless and poor.

BAIF has also been promoting NADEP composting where the quality of the agricultural waste is not suitable to feed the earthworm. Such composting activity has helped in improving the crop production, where farmers have not been using farmyard manure in adequate dose or chemical fertilisers. This activity has also reduced the environmental pollution as a lot of waste is recycled to the field, instead of lying dumped around the households and fields. It was interesting to note that women took greater interest in compost production as compared to men. Involvement of women in crop nutrition management is a new trend, which can be expanded further and replicated all over the country.

Women in Food Production

Horticulture requires intensive and tender care which can be handled very efficiently by women. As women are regular to attend to their farm duties, they can maintain a close supervision on their flowering plants, fruits and vegetable crops and maximise the production and profitability.

Sericulture is another area where women have performed better than men. This is mostly an indoor light activity but requires frequent attention and careful observations. Rural women who are underemployed but unable to migrate in search of employment can conveniently take up silkworm rearing.

Activities like establishment of kitchen gardens, production of oestrus mushroom using agricultural wastes, production of grafted and budded plants, raising of plants in the nursery, establishment of flowering plants, vegetable and fruit orchards can be handled by women groups. As women can grow them with tender care, the

quality of these products can be of high standard to fetch better value.

In Vandsa taluka of Valsad district in Gujarat, BAIF has promoted a nursery of mango and cashew grafts through tribal women. Each group of 4-5 women are able to raise about 5000 plants and earn a net profit of Rs. 6,000-8,000 per member every year. The larger benefit of this programme is easy availability of good quality grafts in the interior areas, almost at 50% of the price in the market. Earlier the farmers had to buy mango grafts at Rs. 35-45 away from their village and hence the small farmers never bothered to plant good quality fruit plants. These grafts are now available at Rs. 15-20 at their doorsteps. The fruit orchards already established under the same programme serve as good demonstration and hence the demand for the grafted plants has also grown significantly. In this process over 10,000 ha of marginal and wastelands have been brought under fruit orchards by the poor tribals, who have now come out of poverty. Women have the major share in this success.

Collection of minor forest produce, particularly oil seeds like neem,

It is estimated that neem seeds worth several crore are wasted uncollected in the field. The reasons for such neglect are lack of awareness about their uses and value and inadequate facilities for processing and marketing.

pongamia, Madhuca indica, ('Mahuva') is another area where women can play a significant role. It is estimated that neem seeds worth several crore are wasted uncollected in the field. The reasons for such neglect are lack of awareness about their uses and value and inadequate facilities for processing and marketing. If these problems are solved, oilseeds collection can be an attractive part time

work for the rural women to generate additional income while the country can significantly boost its GNP through these products which are presently wasted.

Livestock husbandry is another important activity which can be handled very efficiently by women. It has been observed that women manage the dairy animals and small scale poultry better than men. A woman can easily take care of 3-4 cows and a family maintaining 3 crossbred cows can produce 7000-8000 litres of milk and earn an annual income of Rs. 15,000-18,000 per year. In case of small animals and backyard poultry,

women take good care of them as the men seldom have interest in such minor activities.

Food processing is another area which helps in reducing wastage and adds value to the produce. Small scale food processing is a popular activity very well accepted by rural women. The advantage of this activity is that the technology is indigenous, well known to local women, low investment and has a ready market in both rural and urban areas. Such small scale processing can bring down the cost and the benefits can be shared by consumers and producers.

The women participating in food production can be assured of food security for their family as well, while generating gainful self-employment to come out of poverty. Active involvement of women in food production will also lead to sustainable agriculture and ensure food security in the country.

Documentation of successful participation of women in enhancing food production and extending such knowledge among larger section of the community can further boost the food production in the country. □

(Mass Communication—contd. from page 14)

have access to anything and everything of their choice—movie, games, books, news, bank accounts, travel agent, shopping, data banks, friends, relatives, peargroups and interest groups—and at a time of their choice without stirring out the comfort of their homes with just a flick of button on their remote control and computer keyboard. Not only that voice-activated signals may do away with all this trouble of pushing buttons. But like the roads one has to pay toll as and when one is using electronic highway for any service.

Precise nature of the unfolding communicative scenario is difficult to predict. However, it is certain that it is being put in place and that it would fundamentally transform American life—the way people live and work and in turn perhaps the 'life world over'.

Unparalleled and unlimited human connectivity and interactivity without stirring out of homes will transform intellectual, cultural, economic and political life. It will help in saving on transport and real estate. What will happen to the superb highway system and skyscraper office buildings? What implication home bound living and working will have on already fragile family life? Would it lead to greater participation in political debate and decision-making process as is being projected? The citizen would be able

to convey their views on any political agenda or legislation electronically to their representatives and hence necessitating the on going political campaign all the time. In a way the citizen would take the power to make legislation into his or her own hands. They need not wait till election time to express their views and show preference on any aspect of public life.

Tough Battle

There are tough battle about legislations redefining the rule and norms governing the different aspects of information superhighways. Concerns are already being expressed that Information Superhighway, if left completely to market forces, will bypass the poor and minorities. So the public good and making access to all affordable need to be ensured by the federal government through appropriate legislative safeguards.

Whatever may be the precise pattern of the emerging information superhighway it will provide enormous competitive edge to US in international economic and political relations. Developing countries like India need to take urgently steps to anticipate its full implications and use the inevitable emergence and availability of technologies for its benefits and to address some of its major problems of illiteracy, poverty and health service in

our own economic, social and cultural context. Technologies do promise workable and affordable solutions to our problems.

The global television is likely to facilitate greater decentralization and participatory democratic functioning in India. Further, if accepted as a challenge in right spirit, it would stimulate greater creativity for better and more relevant television production and programming contributing to cultural resurgence and providing boost to economic activities. Growing importance of satellite based electronic media which is making global television an increasing reality, today, need to be properly appreciated as it opens up enormous new vistas for marketing goods and services regionally and globally. India certainly can emerge soon as a major player in global television and hence also as an economic market place. Similarly information superhighway or in common parlance Internet etc. would come handy in greater spread in terms of reach and access of a variety of relevant and useful information to different regions, sections and segments of Indian society, thereby ushering in communication revolution and the dawn of information age which hopefully will demolish the present hierarchy social structure leading to more egalitarian society. □

Disaster Management : A Case Study

Jayant Kumar

ON JUNE 9 1998, at 10.30 a.m. the cyclone which hit the Kandla port and the adjoining areas of Saurashtra coast with amazing fury left a trail of destruction behind it. The resultant loss of human lives, livestock, infrastructure and property is by now a thing of the past. Official confirmation is available for 1040 dead, property and infrastructure worth thousands of crore destroyed. Life is now gradually returning to normal for the victims of the cyclone. The Government, NGOs and others continue their effort for restoring status quo. The disaster is no longer reported in the media as it has lost its news worthiness. However, insights available provide us some valuable information on our state of preparedness and can also be useful in enabling us build our future response capacities.

The response to the cyclone, primarily by the Government came into sharp criticism from various quarters especially the affected population. It is thus essential that a comprehensive and critical analysis of the pre, during and post disaster preparedness and response of various government agencies is undertaken. The expected role of the NGOs in all the stages, need for a strong functional relationship with various government departments and agencies involved in information dissemination and in relief and rehabilitation activities need to be looked into.

It is important to remember that the purpose of this paper is not to find fault with any agency or institution (including the NGOs) but to learn from

our experiences, identify areas of concern, fix responsibilities and identify focal points for action in pre, during and post cyclone (also other disasters) situations in the future. The idea is to emphasise the need for strong interphase between the government, panchayats, NGO's and the larger community for establishing an effective disaster preparedness and response system.

State of Preparedness

Before we proceed further, the following facts need to be noted which indicates the level of preparedness, primarily of various government departments and agencies and their communication and follow-up system.

- * The Indian Meteorological Department (IMD) had issued warning at least 24 hours before the cyclone hit the coast. This warning was issued from Delhi as well as Ahmedabad centres of Indian Meteorological Department (IMD).
- * The 10-point signal indicating wind velocity to be more than 100 km per hour was hoisted at least 15 hours before the cyclone actually hit the coast.
- * In spite of the early warning and hoisting 10-point signal the wind speed was under-estimated to be around 60-80 km per hour by the authorities concerned. The preparedness in the government was thus for a speed of 60-80 km and not above 100 km.
- * Communication received by the Ahmedabad Secretariat was not given priority by the concerned officials and thus not communicated immediately. The lack of concern and action on this information indicates total absence of sensitivity, commitment and professionalism.
- * The Senior Officials of some of the interior districts which were affected i.e. Kutch were not even informed of the impending cyclone.

There is an immediate need for initiating action at various levels by all concerned on this issue in order to streamline and improve our disaster preparedness and response capacities.

- * The state government's old system of dealing with the disasters is grossly inadequate and inappropriate i.e. appointment of 'maldaris' temporarily during the rainy season.
- * There was total absence of any disaster preparedness, mitigation and response planning by the state government.
- * Lack of understanding of disaster issues and related capacities for response amongst the senior government functionaries at all levels.
- * Absence of a blue print on district level contingency planning for disasters.
- * No apparent networking or liaison between the government, NGOs and others for responding to emergency situations.

These issues have deep implications. Apart from being an indication of the state of preparedness of the government and its related agencies, they also point towards lack of an overall perspective and a contingency action plan on disaster mitigation and response at the state level.

A disaster manual for providing detailed guidelines for action by the District Collector, various government departments, police and civil defence personnel, NGOs and others should be part of the administration kit.

The facts indicate towards an immediate need for initiating action at various levels by all concerned with this issue in order to streamline and improve our disaster preparedness and response capacities not only in Gujarat but also

in other disaster prone areas of the country.

There is an immediate need for a well defined and articulated communication policy and strategy to be followed during disasters. Communication requirements at various levels should be identified and responsibilities fixed not only for receiving information but also to pass on to the next identified levels with immediate and appropriate action at their own level. This shall not only ensure flow of information from IMD, Delhi and other sources upto the panchayat and community levels but shall also ensure required action at all levels.

Measures for establishing and strengthening linkages between the organisations and institutions responsible for information dissemination (issuing warnings) (i.e. IMD etc.), research institutions and those who act or respond on the basis of the information received i.e. government and NGOs, panchayat and the community and their organisations etc. at various levels need to be initiated. This will require regular interaction as well as development of a long term training and retraining strategy as a planned intervention in knowledge, information and skills building of the people involved. This will not only strengthen the linkages and improve communication but also facilitate access to weather and other related data to all in a simplified and demystified form. This will also facilitate coordination of different departments and others in event of a disaster.

A disaster manual for providing detailed guidelines for action by the District Collector, various government departments, police and civil defence personnel, NGOs and others should be part of the administration kit. This should indicate clear roles and responsibilities of each staff at different levels and their inter-linkages both backward and forward. It is essential

that the NGOs and others concerned are involved in developing this disaster manual as a lot of experience is available with them.

A long term perspective on disaster preparedness and response, not only at

The issue of communication, flow of information, role clarity of various organisations and agencies involved, networking, involvement of the panchayats and strong interface amongst various government departments, institutions etc. are equally important.

the national level, but more so at the Panchayat and District levels needs to be developed and implemented. This perspective should be based on integration of disaster preparedness with development planning. This will require involvement of the community, NGO's, the panchayat members, local government officials etc. This perspective should be gender inclusive and thus take care of special and different needs of the women.

Effective networking with NGOs in the disaster prone areas and the government is essential. This will promote mutual understanding, compatibility and development of common strategies in different locations and disaster specific situations in our responses. It will also avoid overlapping and duplication of work.

Localising the responses in the overall micro context will strengthen local coping mechanisms. Involvement of the Panchayat in the process of disaster preparedness and response has become imperative due to the 73rd constitutional amendment which

makes the panchayats responsible for development work at the village and community level. In spite of the inherent lacunae, there is tremendous potential for mitigating disasters on the basis of identifying and strengthening local coping mechanisms and integrating the same with micro planning exercise of the Panchayat. As this will be location specific, it will be disaster specific and sustainable. The NGOs have a greater role to play in this regard.

The discussion establishes that mere technological advances cannot enable strengthening of disaster preparedness and response capacities. The issue of communication, flow of information, role clarity of various organisations and agencies involved, net-working, involvement of the panchayats and strong interface amongst various government departments, institutions etc. are equally important. The belief, that the common man also has knowledge, skills and information to contribute, respect to traditional knowledge and practices are also essential and needs to find importance in the overall planning in order to enable development of a system which is community based.

In addition to the issues discussed above there are certain other areas which require attention and action.

Additional Concerns

The Government has the most important role to play in facilitating/building nation-wide disaster preparedness and mitigation capabilities. This is emphasised as the scientific and technological capacity building is comprehensive and entails enormous financial investment and coordination. This includes investment in R&D, in related field of science and technology essential for coping up with disasters etc. Building up extensive infrastructure, communication networks, evacuation and also immediate relief and rehabilitation are some of its other major responsibilities.

It is also essential to mention here that the plans of the government at the local and state level have till now taken development and disasters separately.

A sincere effort should now be made by the government to integrate these two aspects in order to have a successful micro level disaster specific mitigation planning as part of a national effort for capacity building for coping with disasters.

The hazard assessment and risk analysis essential for coping with disasters is an exercise which is based on scientific data generated both internally, at the local level, as well as through satellite and other scientific instruments. These information are available with different government departments, research institutions, studies conducted etc. There is a need to have a single window "Disaster Information Facility" where access to all these data is available. This will facilitate proper planning by all including the NGOs in their effort in integrating disaster mitigation with their long term development interventions. This facility should be highly decentralised and available at district and block level also.

Some other areas requiring immediate consideration by the government are briefly listed as follows:

- * Improve the existing warning systems not only in geographical coverage but also in providing precise and accurate information on time.
- * Organise a coordination unit at the national as well as state levels involving the leading organisations, other NGOs and government which will review policies and actions related to disaster preparedness, response and its integration with long term development planning on a periodic basis. Provide regular information to these units on new developments i.e. scientific, technological etc.

- * Improve existing infrastructure in disaster prone areas.
- * Up-date the hazard-zonation map of the country on a regular basis. This is important as new areas are falling under the category of disaster prone regularly, thus increasing the spread of disasters.
- * Identify and nominate a specialised lead agency in each disaster prone area and provide infrastructure and enable capacity building of the lead agency in building capabilities at the NGO level as well as at the level of the community.
- * Devise a policy for involving panchayats in disaster preparedness.

Role of NGOs

Majority of the NGOs aim to work for empowerment of the poor and marginalized through sustainable development efforts. The realisation that the vulnerability is not only physical but also economic and social provides essential propulsion to strongly integrate development activities with disaster preparedness. The concept of vulnerability indicates or rather establishes that a certain group of people are more vulnerable than others during a disaster. Thus poor are the ones who occupy and inhabit areas those are marginal and disaster prone and have diminishing resources to withstand the impact leave alone rebuilding later on. The group predominantly includes people of dalits, scheduled caste and scheduled tribe origin, women and children, elderly and mentally and physically handicapped. As has been stated earlier there is a very loose linkage between disaster and development and hence there is an essential need to integrate disaster preparedness into long term development intervention of the non-governmental organisations.

Here it is also essential to mention that most of the NGOs have not internalised this idea of integration and

(Contd. on page 42)

Use Of Plant Tissue Culture In Crop Improvement

Rakesh Singh Sengar and Madhu Pandey

IN ORDER TO fight biotic and abiotic stresses, a number of approaches have been followed by the scientists to improve the existing cultivars of the crop plants. Some of the important approaches are production of transgenic cultivars, manipulation of the culture media to develop salt and diseases resistant cultivars, making use of somaclonal variation, micro-propagation of elite species, development of isogenic lines etc. Plant tissue culture is a very useful technique in all these approaches. The type of tissue culture research capable of bringing in a great break through in India is outlined as under.

Phosphinothricin acetyl transferase (PAT) gene bar for obtaining transgenic rice plants have been obtained. The plants are resistant to the herbicide Basta. Similarly bialafos resistance (Bar) gene has been introduced in wheat under the control of rice actin promoter. CP gene genetically engineered cucurbit plants resistant to virus have been developed. Again using *Agrobacterium* mediated transformation work on the production of transgenic Litchi is in progress. Somaclonal variation has been utilized to produce new cultivars of sugarcane and salt tolerant safflower. Another culture has been used to produce fine grain type rice tolerant to submergence. *Bacillus thuringiensis* a Gram positive sporemaking bacteria, used widely as a biopesticide (cry IA(C) gene, has been successfully transferred to the plants of tobacco using *Agrobacterium* mediated transformation, after suitable modification from a *thuringiensis*.

Genetic improvement of aromatic crops has been achieved through the

transfer of the foreign DNA using *Agrobacterium*. Using somaclonal variation the genetic improvement of finger millets has been achieved; similarly somaclonal variation has been used to select Basmati Rice-370 tolerant to high salt. Somaclonal variation has been used to develop wheat tolerant to leaf blight. Attempts are being made to produce transgenic wheat lines with high lysine content in their seed proteins using biolistic methods. Similarly genetic transformation has been attempted in chick-pea to develop resistant lines to pod borer (*Helicoverpa armigera*) using *Agrobacterium* mediated transformation.

Ovary culture derived rice plants in Pantnagar are being tested for their performance. In another interesting study done in the department of Plant Physiology in Pantnagar, miniature cobs in maize in tissue-culture generated plants were produced. It is now possible to generate these miniature cobs at will and the system is being explored further to locate the genes and their regulator sequences responsible for the development of cobs. Using tissue-culture it has been possible to develop haploids and dihaploids in the major oil seed crop of India. In an outstanding study conducted in the Department of Molecular Biology and genetic Engineering in Pantnagar, production of *in vitro* flowering plants regenerated from the *Brassica Campestris* (yellow sarson protoplasts) has been made.

The storage proteins of mungbean and pigeon pea generated through tissue culture are being studied. Technique of Gamma radiation has been applied recently to generate variations in sugarcane during the tissue culture by the scientists of Indian Institute of Sugarcane, Lucknow. The technique is being further examined to enhance somaclonal variation in sugarcane. In another interesting study the ploidy level of plants generated through tissue culture of cotton have been studied to improve the existing cultivars of cotton. Studies are in progress in Agriculture and Food Engineering Department of IIT Kharagpur to improve the present cultivars of Safflower, an important oil seed bearing cultivar

In view of the enforcement of intellectual property rights and opening up of the world market, it has become essential that we utilise this powerful technique for cloning and mass production of elite varieties of crops.

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through tissue-culture. In a bid to develop new varieties of grass used for fodder, studies are underway in the Indian Grassland and Fodder Research Institute in Jhansi on marvel grass and buffel grass and considerable success has been achieved in the tissue culture of these grasses.

A private research foundation of north India has achieved success in somatic embryogenic studies in Neem and complete plantlets have been generated *in vitro* which appears a panacea for all maladies.

Micropropagation

In Indian Jasmine, a plant noted for its aroma, micro propagation has been achieved. Chrysanthemum root suckers can now be obtained from the tissue-culture generated plants. Micro-propagation of ornamental plants has resulted in the protocols which can generate large number of plantlets in the laboratory. The micropropagation of rice cultivars, banana, pigeonpea, sunflower, and potato has been achieved and protocols are being developed to generate these plants in large number so as to improve the existing cultivars.

Micropropagation of *Delonix regia*, a tropical legume ornamental tree, has been achieved. Likewise, protocols are now being standardized for the tissue culture of such important forest tree species as sisam and teak in a bid to improve the quality of their wood and mass propagation.

The tissue culture of mango has not been very successful so far. In a major headway in mango tissue culture some commercially important varieties such as 'dasher', 'chausa', 'langra' and 'safeda' have been cultured *in vitro* at the National Botanical Research Institute, Lucknow. Further, studies are on to improve the protocol for tissue culture. Clonal propagation of peach, and 'aonla' is now a distinct possibility. Studies on the micropropagation of multi-berry varieties in the Mysore university has yielded protocols for their mass propagation.

Development Biology

Tissue culture is a powerful tool for the

studies in the field of development biology. Transgenic plants of soybean have been generated and the enzyme glutamine synthetase has been successfully used as a marker of ammonia assimilation. Tissue culture is also a means to induce somatic embryogenesis in winged bean. Studies on the polyamine biosynthesis in relation to stress tolerance in egg plant, and the effect of polyamines in somatic embryogenesis of eggplants are in process in the Department of Genetics in the Delhi University.

Serious attempts are being made to generate know-how for mass propagation and genetic improvement of rare and threatened plants of Thar desert and Aravalli. Tissue culture methods have been defined for such plants. Tea is a major plantation crop of India. With the support of the Department of

Tissue culture is now a very powerful means for the mass production of plants of desired varieties at a minimum cost, and in a limited space.

Biotechnology, tea tissue culture is being pursued in the G.B. Pant Institute of Himalayan Environmental and Development, Almora.

Microtuber formation for mass cultivation of Kalazeera, an important medicinal plant, and micro-propagation of other medicinal plants such as fennel, cumin, ocimum, *Achyranthes* etc. is being done in M.S. University of Baroda. These plants produce high yields of desired compounds. Two other medicinally important plants, namely, *Ammi maius* and *Datura* used for the production of hyposcyamine and furocoumarin umarin have been successfully cultured *in vitro* in Hamdard University, New Delhi.

Alpha-bisabolol is an important raw material for cosmetic industry. Studies to produce this compound by the callus of popular generated from the tissue culture are in progress in Pantnagar. Further,

studies are being carried out to standardize the protocol in the Department of Molecular Biology and Genetic Engineering in Pantnagar.

Tissue culture is now a very powerful mean for the mass production of plants of desired varieties at a minimum cost, and in a limited space. The technique known as micropropagation has proved very effective and economical for cloning of elite varieties of plants. Micropropagation of cotton is also underway.

Woody ornamentals like *Tabebuia* bear colourful and showy blossoms and play pivotal role in the bioaesthetic planning. A successful micropropagation to *Tabebuia* has been achieved in the Botany Department of Mysore University. Further work in this connection is underway to establish and standardize a protocol for the mass propagation of *Tabebuia* on a commercial scale.

Commercialization

In view of the enforcement of intellectual property rights (IPR), and with the opening of world market, and the liberalisation of trade and commerce in the post GATT era, it has become essential that in India we utilize such a powerful technique as the tissue culture for cloning and mass production of elite varieties of crops, forest trees and ornamental plants. India with its vast biodiversity has unlimited potential to earn foreign exchange competing successfully in the world market. There is going to be a global demand of over 2 billion plants by the turn of the century against 500 million plants produced presently by micropropagation and the market for it is expected to be worth US \$ 50 billion per year. There are at present about 100 commercial companies of the capacity for producing more than a million plants, of which in India there are hardly six. Covered under floriculture is about 35000 ha in India as against 3600 ha in the Netherlands. But the world share of India is a dismal 0.1% of the trade the share of the Netherlands is a hefty 67%. The Indian Government has, however, announced certain incentives and concessions for promoting export of flowers. □

*(Striding Towards—
contd. from page 27)*

It has been decided to deblock all those titles verified by the Registrar of Newspapers (RNI), where publications were not registered as on December, 31st 1995.

COMMERCE

IMPROVEMENTS introduced in the EXIM Policy 1997-2002, which include :

announcement of DEPB (Duty Entitlement Pass Book) rates for 2000 export items.

allowing the setting up of private bonded warehouses for timely availability of raw material to exporters at internationally competitive prices.

reduction in threshold limit under the EPCG (Export Promotion Capital Goods) Scheme from Rs. 20 crore and Rs. 5 crore to Rs. 1 crore for agriculture and allied sector, garments, electronics, sports goods, toys, leather, gems & Jewellery.

extension of tax holiday for infrastructure projects.

Rate of interest on pre-shipment & post-shipment credit reduced from 11% to 9%.

Tax holiday for EOUs and EPZs extended from 5 years to 10 years.

Permission to private technology parks to avail of EPCG scheme.

A programme called LAC initiated for enhancing exports to the Latin American Region.

Special package announced for electronics sector.

A special Directorate on Anti-Dumping & Allied Duties set up in the Ministry of Commerce.

ENVIRONMENT AND FOREST

NATIONAL Environment Appellate Authority starts functioning. It hears appeals against orders granting environmental clearance.

Notification banning recycled plastic

carry bags, containers and packing material to be brought soon.

National Environment Fund proposed to support environment projects.

Ministry suggests incorporation of Green Budgets for sectoral plans.

Expert Committee to look into reports of Sal tree infections in Madhya Pradesh.

Supply of leaded petrol stopped in Delhi.

Environment to be included as a separate subject in school curriculum.

Kaziranga National Park sanctioned Rs. 58 lakh to help repair damage caused by the recent floods which killed 45 rhinos.

Two more reserves—Bhadra in Karnataka And Pench in Maharashtra added to Project Tiger in its 25th year.

A comprehensive insurance cover to be given to forest guards and employees working in National Parks And Protected areas.

PLANNING AND PROGRAMME IMPLEMENTATION

DRAFT IX Plan has been finalized. Its salient features are:

Food production is to be doubled in 10 years time.

Drinking water is to be provided to every settlement in the country within five years.

Social and physical infrastructures like housing, education, health care, sanitation, power, fuel, roads, ports, airports, telecommunication and financial services are to be improved and expanded.

National Water Policy is to be unveiled to ensure optimum use of available water.

India to emerge as a global Information Technology power and one of the largest generators and exporters of software within 10 years.

An ambitious housing policy to be evolved to provide housing for all.

Proposed growth through generation

of gainful employment.

Increased emphasis on agriculture, rural development and irrigation in the state plans for the current year.

Outlay of states increased by nearly 38%.

Allocation of funds towards anti-poverty programmes increased. States allowed additional SLR facility.

Non lapsable fund for infrastructural development in the North-East & Sikkim created.

HOME AFFAIRS

A multi pronged strategy adopted to improve internal security situation.

A special six member group constituted to prepare a specific action plan to tackle militancy in J&K.

677 militants were killed in J&K till September this year. 216 out of this were foreign mercenaries.

A sum of Rs. 100 crore has been announced for security related expenditure in Assam. An additional Rs. 1 crore will be given to the 30 worst insurgency affected districts in the North-East.

Guidelines have been approved for reimbursement of excess security related expenditure by the North-East states.

Ceasefire with the National Socialist Council of Nagaland has been extended for another year.

The Centre has approved a proposal for restructuring the North-Eastern Council by including Sikkim, deleting Governors of NE states as members, including three members nominated by the President of India and delegating administrative and financial power to the council.

A High Powered Committee has been constituted to suggest means to improve the functional efficiency of the police.

Monthly assistance to child victims of ethnic, caste and terrorist violence raised to Rs. 550 in A&B class cities and Rs. 500 in other places. Children doing professional courses will get another Rs. 150 per month. □

(Marmugao—contd. from page 29)

shifted to development of infrastructure. A couple of years after liberation, the port was delinked from the railway management. The main railway section from Vasco da Gama to the border of Goa was transferred to the Southern Railway. The port however, operated its own railway system between the Vasco da Gama interchange point and the harbour area.

Today, Mormugao occupies a

prominent position as India's premier iron ore handling port. Upto 15 million tonnes of ore are exported through this port each year to different countries like Japan, Korea, China, Romania, the Gulf countries, African and European countries, accounting for 45 per cent of the entire iron ore export of the nation.

It was more than a hundred years ago that the Portuguese first initiated development in Mormugao port. Today, the wheel has turned full circle, with the

setting up in the port premises of the major ship repairing complex, Western India Shipyard Limited, in collaboration with the Portuguese company Lisnav, equipped with a Floating Dry Dock of 15,000 TLC, accommodating ships of upto 60,000 DWT/215 metre LOA. Besides this, a number of licensed, specialised firms offer ship repair facilities as also Goa Shipyard Limited, which is a Government of India Undertaking. □

(Environmental—contd. from page 31)

lowered. Especially dangerous to man are increasing doses of ionizing radiation as a result of the testing of nuclear weapons. Radioactive strontium accumulates in the atmosphere. It causes deep changes in the haemopoietic function of the bone marrow, the formation of tumours and impairs reproductive ability.

Hygienic Conditions

Poor sanitary hygienic conditions have an unfavourable effect on the human body. Despite the fact that there is approximately 2 million tons of air per each person, due to pollution in large cities and industrial centres the incidence of respiratory diseases among the people is

growing. This results in the spread of chronic diseases. The polluted air has a detrimental effect on animals and the vegetable kingdom. A deficiency of oxygen in the building, an excess of carbon dioxide and other harmful gases cause chronic toxicosis and are favourable for the development of tuberculosis. The presence in the air of dust containing a large amount of silicates disturbs the integrity of the mucous membranes of the respiratory tract, increases the possibility of infection by different microorganisms, and leads to such diseases as tuberculosis, actinomycosis, aspergillosis, etc. Limited isolation also causes various disturbances in the activity of the body and enhances

the development of diseases.

Besides these harmful external factors, a great influence on the susceptibility to infectious diseases is caused by various somatic diseases, such as diabetes and other disturbances of the endocrine organs, diseases of the cardiovascular system, liver, kidneys, chronic poisonings by alcohol, nicotine and other poisons. Thus, the infectious process reveals itself in the unity of biological, environmental and social factors. The disease incidence, severity of the clinical course and death-rate depend closely on the activity of the main economic and environmental laws of social formulations. □

(Disaster Management—contd. from page 38)

hence taken both these issues separately. This has resulted in development of specialised agencies in development and also in disaster relief, rehabilitation and preparedness. This integration needs to be undertaken in all interventions of NGOs whether they be in desert, or in a drought prone areas or in the hills.

When a disaster strikes in an area, whether it is natural or man made, the impact of it is immediate on the people mostly poor and marginalised. Waiting for the government to respond or for an NGO to provide help increases the intensity of impact. Hence the capacity building of the local people both in terms of management, skills and

resource mobilisation is essential. The ability of the community to respond on its own through its own preparedness and resources should form the core of any intervention.

Thus, it is evident that a lot of systematic and coordinated action is essential in order to minimise the impact of natural or man-made disasters. The primary responsibility for this action rests with the government, both at the national and state level. The Panchayats have a very meaningful role to play in this if the interventions have to be self-sustaining. Integration of disaster preparedness with development planning is essential. The role of NGOs is also significant as

they work directly with the poor communities who bear the brunt of disasters. In developing local coping mechanisms the communities' wisdom, knowledge, practices and skills are to be identified and upscaled. Linking people's survival skills with their traditional knowledge and popular science is unavoidable. Finally, a system that works will be the systems which can effectively and functionally integrate the administration, Panchayat, NGOs and the community in developing a location and disaster specific mitigation and response system. Achieving this in the current socio-economic context seems difficult but there is no alternative. □

Nutritional Aspects Of Edible Oils

R.K. Tarat and B.K. Sarma

THE USUAL EDIBLE fats and oils are non-toxic and these have had a long history of use by humans. Individual fatty acids have been implicated in toxicity, but under special conditions. The conditions to which fats are subjected, either in processing or in the preparation of foods, can alter nutritional value. The heating of fat in the preparation of foods also can result in changes in nutritional quality. The heating of fat, particularly if it is prolonged, leads to the formation of a variety of compounds, some of which are potentially toxic.

Fats in the diet can be of two kinds, the visible and invisible fat. The visible fats are those derived from animal fats like butter, ghee which are solid fats and those derived from vegetable like groundnut, sunflower, safflower, mustard etc. are liquid fats. Hydrogenated vegetable oil known as 'vanaspati' is a solid fat. Apart from the visible fat, some amount of invisible fat is present in other food items like cereals, pulses, oilseeds, milk and egg, meat etc. which also contribute significantly to the total fat and essential fatty acid (EFA) content of the diet.

The types of edible fat consumed affect both the cholesterol level and its form of circulation. Earlier research had shown the cholesterol lowering effect of oils rich in polyunsaturated acids, like safflower, sunflower and soybean. However, later work revealed that polyunsaturated acids also produced free radicals in the body, which hasten the ageing process and even induce cancer. Till recently, high amount of

polyunsaturated fatty acids (PUFA) was considered to be desirable not only from the point of supplying EFA, but also because of blood cholesterol lowering effect. However, in recent years it is realised that high level of PUFA are undesirable. Hence oils like groundnut oil, ricebran oil with 25% linoleic acid may be more desirable. Linoleic and linolenic acid, although cannot be synthesized by human cells are called EFAs as these are essential for growth and development of human cells. In addition to the quantity and quality, the mode of consumption of fat also appears to influence elevation of cholesterol in blood. At the same level of daily intake, consumption of smaller amount of fat a number of times (frequently) during a day has been shown to cause less elevation of blood cholesterol content as compared to consumption of the same total daily fat intake at one time of the day.

From the foregoing it can be stated that selection of proper edible oil is of paramount importance in relation to health. Oils behave differently in the plant and in the human body. Let us see what some edible oils offer.

Mustard oil is one of the major edible oils used for culinary purpose and is consumed in large quantities in India. The fatty acid content, mainly the linolenic acid is the key factor responsible for the quality of mustard oil. It is also rich source of linoleic acid. Erucic acid in mustard oil may range from 40-60% of the oil content, which has been implicated in heart disease. Argemone oil, a chance or wilful contaminant (as seed) in mustard oil, even in very small quantities leads to glaucoma and endemic dropsy. A study based on a toxicological investigation in the sub-human primate (monkeys) revealed a marked localisation of erucic acid in the heart muscles of the monkeys fed with mustard oil. This study on monkeys although demonstrated the toxic effects of feeding high levels of mustard oil on the myocardium, the question remains of its experimental

Selection of proper edible oil is of paramount importance in relation to health.

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observation on man. It must be emphasised here that the levels of mustard oil used in the study are high and are unlikely to be used in habitual human diets. Available evidence suggests that the level of intake of mustard oil is perhaps critical. The normal operative levels of intake of mustard oil, perhaps, does not pose any health hazard in man. However, effects of long term consumption of mustard oil are yet to be discovered.

Rape seed oil is a light oil with no flavour of its own and contains about 90% mono and poly-unsaturates. The rape seed oil available in the market is in a highly refined state and as such lacks many important nutrients. It also produces toxic effluent when cooked as it is less stable than many other oils at high temperatures. Rapeseed oil is inferior in quality to other vegetable oils as it contains very high amounts of undesirable fatty acids such as eicosenoic acid (about 10%) and erucic acid (about 50%). Erucic acid has been found to be the cause of nutritional disorders linked to heart damage in animals. Many countries have put a statutory limit on the intake of erucic acid although the comparable results are not available in human beings. The efforts are now under way to develop zero erucic acid varieties suited for Indian conditions.

Groundnut oil is usually highly refined and loses many of its healthy attributes in processing. In the raw state, it is a source of vitamin E (21 mg. 100 ml⁻¹), a monounsaturated oil; also contains a high level of polyunsaturated fatty acids and are considered good to satisfy our EFA requirements. This oil is devoid of linolenic acid but contains good proportion of linoleic acid (29.9%) and is rich in oleic acid content (47.9%) besides other EFAs. Groundnut in the raw state are highly nutritious and consists of about 45% oil and 30% protein and valuable quantities of iron and vitamin B (niacin). Groundnut oil, like rape seed oil, has a high smoke point and so it is often recommended

for shallow frying. It has been shown in recent years that oil-seeds, particularly the groundnut, get affected with fungi if they are not dried properly at the post harvest stage. This fungus elaborates some toxins which are deleterious to health and some of them are carcinogenic. Raw groundnut oil could carry aflatoxins produced by the fungus *Aspergillus flavus* which are potent liver toxins.

Sunflower oil is light and slightly sweet. Sunflower seed is the source of high quality edible oil with high content of PUFA and when unrefined contains useful levels of Omega-6 EFAs. It is a

Cereals and vegetables contain oil enough for our daily requirements and so there is nothing compared to cooking without oil or a bare minimum.

good source of calcium, protein, Vitamins B₁ and B₆ and potassium. The natural oil contains relatively high levels of Vitamin E (227 mg. 100 ml⁻¹). Sunflower oil is best used cold or at low temperatures as it breaks down to yield toxic elements at high temperatures and this oil must be stored in a refrigerator.

Sesame oil is highly priced for its quality as it contains large quantities of unsaturated fatty acids i.e. oleic acid (41.2%) and linoleic acid (44.5%). The oil is mainly used for manufacture of 'vanaspati' (89%), margarines and in its unrefined state is a very versatile cooking oil. Being a monounsaturated oil, it can be heated to higher temperature than polyunsaturated oils without forming toxic elements.

Soybean oil is a relative newcomer to the cooking oil market. When unrefined, soybean oil is an excellent source of Vitamin E (87 mg. 100 ml⁻¹) and contains more lecithin than any other vegetable oil. Like rapeseed oil, it has a high smoke point and should not be used for frying.

Corn oil is not only rich in linoleic acid (57.4%), but also superior from storage and nutritional point of view. It is also highly digestible. The low level of linolenic acid content is indicative of good keeping quality. Corn or maize oil, little known in the cooking oil world in India, is high in polyunsaturates. In the unrefined state it contains useful levels of natural antioxidant Vitamin E (66 mg. 100 ml⁻¹). Being a poly-unsaturated oil, it is a good source of Omega-6 EFAs. Corn oil deteriorates when heated to high temperatures; so it is best used in cold or warm recipes such as sauces and chutneys. It needs protection from heat, light and exposure to air and should be stored in refrigerator.

Palm oil is the second largest oil produced in the world and is also imported in India and Palmolein is the refined palm oil. Palm oil has 50% saturated fatty acids and is a rich source of carotene, tocopherols and tocotrienols. Recent studies on animal and human have shown that palm oil does not raise the levels of blood cholesterol. It has also been shown that palm oil does not promote 'atherosclerosis' and has no effect on blood pressure. In addition, palm oil has been shown to decrease both the incidence and number of tumors in animal models as compared to diets containing polyunsaturated fats.

Ricebran oil is coming up as an important edible oil source in India which has fatty acid composition similar to groundnut oil. This oil is being used as an edible oil in Japan since centuries. China, Korea and other countries also use ricebran oil as edible oil. Ricebran oil is quite rich in oleic acid (39.2%), linoleic acid (33.3%) and palmitic acid (16.5%) and this oil has a special property of reducing plasma cholesterol, a property not shared by groundnut oil.

Cotton seed oil contains more than 50% of linoleic acid—an essential fatty acid. It has a little more than 20% oleic

acid. It has recently been reported that oleic acid is equally as good as polyunsaturated fatty acids in lowering blood cholesterol. Raw unrefined cotton seed oil is reddish brown in colour because of the presence of gossypol and related pigments. However, refined cottonseed oil has a pale yellow colour comparable to that of groundnut oil and is free from gossypol and related pigments. Further, cottonseed oil does not contain any unsaturated fatty acids having more than two double bonds, hence a good shelf life, even though it has a total of 70% unsaturated fatty acids.

Olive oil though not a frequent frying medium, particularly in our country, its chemical structure remains the most stable at high temperatures with few negative factors and greater numbers of health giving properties in cooking terms. Olive oil has traditionally been used for stomach disorders and is known to stimulate bile production, encourage the gall bladder to contract, thereby reducing the risk of gall stones. It also promotes pancreatic secretions and may even

protect against stomach ulcers.

Walnut oil is polyunsaturated and contains low levels of gamma linoleic acids and is best used cold in dressings, sauces and chutneys and should be kept in the refrigerator once opened.

Almond oil is a good source of monounsaturated fatty acids and its most recent role is in the prevention of heart diseases. Researchers have found it to be twice as effective as the better known olive oil in reducing build up cholesterol.

Coconut oil has many intrinsic qualities which makes it different from the commonly available vegetable oils and contributes about 0.3 million tonnes of oil annually. It has a very high content of short and medium chain fatty acids which are characterised by having a carbon chain length of less than 12 carbon atoms. Though basically a saturated oil, 62.74% of the total fatty acids and as much as 70% of the saturated fatty acids present in coconut oil are medium chain fatty acids (MCFAs). On the other hand, the dominant fatty acids present in other

vegetable oils have a chain length of more than 12 carbon atoms and, hence, are grouped as long chain fatty acids (LCFAs). It is now generally recognised that coconut oil which is endowed with an abundance of MCFAs is a valuable fat source for infant feeding and for adults who have difficulties in utilising food fats. Nutritional studies have also revealed that the consumption of MCFAs increases the proportion of cholesterol carried in the high density lipoproteins which is protective or beneficial. The MCFAs have also been found to check some of the adverse effects associated with the consumption of partially hydrogenated forms of unsaturated oils and the excessive intake of essential fatty acids such linoleic acid contained in the unsaturated oils.

The affluent segments of Indian urban societies show an exceptionally high incidence of obesity, heart disease, hypertension and diabetes, and dietary fat may have a part to play. In fact, cereals and vegetables contain oil enough for our daily requirements and so there is nothing compared to cooking without oil or a bare minimum. □

Fatty acid composition of some important edible oils
(values are percentage of total methylester of fatty acids)

Sl. Oil No.	Palmitic 16:0	Stearic 18:0	Arachidic 20:0	Bethenic 22:0	Lignoseric 24:0	Total Saturates	Palmitoleic 16:1	Oleic 18:1	Linolic 18:2	Linolenic 18:3	Total Unsaturates
1. Mustard/rapeseed oil	2.9	0.9	6.9	—	—	10.7	0.6	8.9	18.1	14.5	88.6*
2. Groundnut oil	12.6	1.7	4.2	2.1	0.3	20.9	1.4	47.9	29.9	—	79.1
3. Safflower oil	7.8	2.1	0.8	—	—	10.7	—	17.7	78.5	—	92.2
4. Sunflower oil	5.6	2.2	0.9	—	0.4	9.1	—	25.1	66.2	—	81.3
5. Sesame oil	9.7	3.4	—	—	—	13.4	0.1	41.2	44.5	—	86.5
6. Soybean oil	9.8	2.4	0.9	—	—	13.1	—	28.9	50.7	6.5	86.1
7. Ricebran oil	16.5	1.6	—	—	—	19.5	—	39.2	33.3	—	74.6
8. Palm oil	42.0	4.3	—	—	—	47.9	—	37.9	9.0	—	47.7
9. Olive oil	11.5	2.3	—	—	—	14.2	—	71.5	8.2	—	81.4
10. Corn oil	10.7	1.7	—	—	—	12.7	—	24.6	57.4	—	83.0
11. Cottonseed oil	23.4	1.1	1.3	—	0.1	25.9	—	22.9	47.8	—	70.7
12. Coconut oil	7.8	2.3	—	—	—	87.9**	—	7.8	0.8	—	8.6

* includes 46.5% Erucic acid (22.1)

** includes lower chain fatty acid

Books

DESIGNING: PRINT COMMUNICATION by N.N. Sarkar, Sagar Publications, Pp. 200, Rs. 300.

Designing: Print Communication has a serious purpose of communicating complex design ideas and concepts in a simple style. Clarity of thought gets reflected in the presentation. The book discusses the newspaper make-up, advertising design, identity mark, periodicals, poster design, packaging design, design of direct pieces and book design.

In his preface the author says: "Design belongs to the domain of creativity and there may be hundreds of varieties in various printed literatures. I have attempted to group them—each topic is unique in imparting the message through its contents and visual appearances. Design problems have been handled, keeping in mind their special characteristics—a newspaper make-up is done with the time constraint and its short life is the primary concern of the designer. Identity marks, on the other hand, have a long lasting value. Books too have a long shelf-life. Advertising design has ephemeral value. Packaging design works as a silent salesperson on the shelf".

Designing: Print Communication is primarily meant to be a text book for those who have chosen print medium as their profession. So each chapter contains objectives in the beginning and summary at the end.

For example "Newspaper Make-up" expresses the following objectives:

- ☐ To know the purpose of a design for a newspaper.
- ☐ To examine a newspaper's constraints in designing.
- ☐ To discuss the form and format.

- ☐ To identify the elements of design and their impact on newspaper pages.
- ☐ To discuss the basic principles in newspaper designing.

The book is profusely illustrated, elucidating each point made in the text. These illustrations while serving a basic purpose also add colour and variety to the text. Thus making this one of the best designed books.

Mr. N.N. Sarkar is not only a professional designer but he is also a teacher teaching design, typography and print production to students of journalism, Advertising and Public Relations and other professional courses at the Indian Institute of Mass Communication. Professor Sarkar claims the present volume as an extension of his earlier book "Art and Production".

These two books, products of much study and research, analysed in the light of practical experience which is enriched day by day as technology unravels its marvels, are indeed remarkable contributions to the art and design world and useful reference books to students and professionals alike.

Dr. J. Bhagyalakshmi

ELECTORAL POLITICS AND GENERAL ELECTIONS IN INDIA by M.L.Ahuja; Published by Mittal Publications, New Delhi; Pp. vii+412pp; Price Rs. 595.

The book under review is an analysis of the entire electoral politics in India starting with the circumstances that led to the need for holding the 12th general elections. The author dwells at length on the factors leading to the growth of regional parties in India. This is followed

by a chapter on the Election Commission of India. In 28 pages, the author explains the composition and scope of the EC, the electoral law, powers of the Commission, grounds for election petition, limit imposed on election expenses, criminalisation of politics, the question whether the 1998 was a clear poll and electoral reforms.

The book is divided into six sections. Section II is appropriately titled "The Battlefield" and contains 32 chapters, each one providing the electoral scene of the state concerned. Section III titled "The Warriors" deals with 17 political parties and organisations which participated in the 1998 general elections. Of these, the book provides detailed explanation in respect of the key contestants, e.g. Indian National Congress, Bhartiya Janta Party, United Front, Jan Morcha, Tamila Manila Congress, Samajwadi Party, the CPI, CPM etc.

Section IV of the book is on Electoral Strategies. In five separate chapters the reader gets a fair idea of how politics in India has embroiled itself in various electoral strategies. This is evident in political parties echoing the support of women for their 33 per cent reservation in legislature. But when it comes to their supporting the Reservation Bill in Parliament, one is able to assess what actually or politicians have in mind. The Bill is allowed to be put in cold storage due to one reasons or the other. The chapter on "Women on the Electoral Scene" also draws its own conclusion.

Politics is a strange phenomenon. It gives rise to innovative issues on the eve of elections devised by the politicians to influence the voters. It is a moral coercion exercised on the voters, writes the author, in his chapter on Dalit politics. After analysing the agenda and performance of the various political parties, the author concludes that the solution does not lie in reservation but in taking steps to redress the grievances of the depressed classes.

The chapter captioned "On the

campaign Trail" brings to focus the professional approach witnessed in the electoral battle, roping in of filmstars, planning and preparation of films, video cassettes and audio cassettes to woo the voters, the 'star wars', use of electronic media and the role of TV channels.

What then has been the outcome? What are the vital issues which remained untouched in the 12th general elections? What the 1998 verdict means to us? Will the new government survive? All this forms the quintessence of four chapters in Section V.

The most important issue explained in Section VI is Article 356 of the Indian Constitution. The Article has been explained threadbare. List of participating political parties, size of electorate during 12th general election, voter turnout, list of successful candidates in the 12th general elections, results of general elections held from 1952 to 1998, women's participation in 12th general elections, National Agenda for Government, performance of various political parties in the 12th general elections, and formation of the new government form the subject matter of Section VI.

All this should make it a useful book for understanding the modern day politics in India. This should also serve as a valuable reference book for all political parties and persons engaged in electoral study.

S.P. Malik

RURAL AND RENEWABLE ENERGY: PERSPECTIVES FROM DEVELOPING COUNTRIES: Edited by Venkata R.P., Tata Energy Research Centre, New Delhi 1997.

Majority of the population in developing countries still live in the rural areas in an agrarian economy and heavily depend on biomass fuels for meeting their energy requirements. However, severe pressure on the natural resources and also limited access of rural people

to fossil fuels is rendering the rural energy systems economically and environmentally unsustainable in most countries. In order to deal with this "other energy crisis" situation several countries have been promoting the renewable energy technologies based on solar, wind, water and biomass resources. China and India, the two most populous nations in the world, have been at the forefront in disseminating renewable energy devices in rural areas. In the last two decades, several successes, as well as failures have been experienced, which could provide valuable feedback to formulate policies for better implementation of the programmes in the future.

An attempt has been made to synthesize these experiences in policy formulation and programme implementation in this publication. It is primarily a collection of articles written by researchers at TERI in last five years and also by professionals and academicians from different developing country institutions. Due to the timeframe, statistics presented in a few articles may be slightly old, but most of the experiences and lessons learnt are relevant for policy makers, planners, programme implementors and research professionals.

The book has been broadly divided into four sections which deal with different aspects of rural and renewable energy including its importance for rural areas, policy issues/strategies, assessment of supply and demand for future, different energy programmes of India, China, Pakistan and institutional issues, commercial and financial issues for its development.

The first section deals with the rural and renewable energy policies and implication for effective intervention programmes in rural energy section, technology development and the environment. The second section covers the demand, supply and potential of renewable energy sources like wood fuel in the Philippines, biomass fuel in

Pakistan and India. Various analytical and statistical tools have been used to assess the demand of these energy resources for meeting future energy requirements. The third section describes the experiences of various programmes undertaken for promotion of rural and renewable energy in India, China and Pakistan. An assessment of various policies that have been undertaken to promote renewable energy have been discussed and different measures are suggested like provision of subsidy to beneficiaries, linking renewable energy programmes with employment opportunities etc. to promote this sector further.

Finally the last section discusses the institutional and policy aspects related to rural and renewable energy including current financial structure to identify the current emphasis on development of these energies. It also gives an overview of experiences in these technologies highlighting issues of technology development, financing and commercial management and marketing. The role of women in these programmes can be enhanced by involving them in planning and implementation in rural areas. Lastly, suggestions have been put forward to remove the institutional barriers that hinder the development of renewable energy in India. Thus this book has tried to cover a whole gamut of relevant issues.

The articles in the book are presented in a simple language, but the various tables/diagram used are very technical giving scientific formulas which can be understood only by professionals/experts in similar field—rural and renewable energy. This book will be useful only for a specific category of people who are working in energy related research institutions and technical colleges where students can use it as a reference manual as it gives clear insight into the various aspects relating to rural and renewable energy in totality.

Abha Agarwal

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Ayurveda Offers Simple Cure

Fistula in ano is a painful disease of the ano-rectal region, causing lot of suffering and inconvenience to the patient. It is manifest in itching, pain, discharge from the opening somewhere around the anal region (perineum). Modern surgical management involves surgery and prolonged hospitalisation. The recurrence rate is quite high under this procedure. Introduction of the ancient Kshar Sutra therapy has given new impetus to the management of this problem.

In Kshar Sutra, patient does not require hospitalisation and remains ambulatory. The recurrence rate is negligible and it is quite effective in high anal and ano-rectal variety of fistula in ano.

This practice of Kshar Sutra has been adopted not only by the practitioners of Ayurveda but also by the practitioners of modern medicine. Efficacy of this procedure has been proved by various studies conducted by ICMR and the Central Research Institutes for Ayurveda at New Delhi and Mumbai.

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