Community Health Learning Programme: 2008-09

Adithya P
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Why I joined the fellowship:

Since a very young age I have been a nature lover but circumstances were such that I was not able the dwell much into this passion I had. While doing pre-university I decided to become a doctor and pursue my interest in environmental issues as a hobby. Tough we had a subject called Community Medicine it did little to show the importance of nature in the matters of our health and it was a mere extension of the hospital based approach. I speak now in retrospect about the subject when I say that a lot more could have been done to improve a medical student's perspective into the origin of diseases and to sensitize about social and environmental issues. The subject was taught in a very politically correct method which doesn't help too much at the end of it. As my final days of internship approached, I started to consider this as the right time to explore my options in the field of environment and health and that is when I approached Drs. Ravi and Thelma Narayan and I learnt that the Community Health Learning Programme may just be what I am looking for.

Over the years I was getting more and more confused and critical about the consequences of the dominant societal paradigms of education and development and I felt that the experience at Community Health Cell will be very useful.

It was a matter of great fortune that I did get chosen for the programme as I had applied in the last minute. Not just that, my CV spoke mostly of my interest in the field of environment and showed absolutely no practical exposure of which I could speak of. I had never worked in an NGO or through a nature club.

Through this experience I was hoping to get a better understanding on the interconnectedness of various issues, be it health or social or environmental. I was also hoping for field visits, on-hands learning experience and connecting with other individuals and groups with similar interests.

Acknowledgements:

Due to the limitations of my literary skills and vocabulary I can only express my deepest gratitude with the following words.

Despite my absolute inexperience in the field of community health and social issues, and despite my last minute application for the programme, the interview committee was so very graceful in accepting my application for it. I thank Drs. Thelma and Ravi for considering me worthy of the programme and encouraging me to apply for it.

I thank Dr. Sukanya for the wonderful way that the programme was arranged and for creating an atmosphere conducive for discussions and learning. In addition to that, she played the role of my mentor and has given so much of her valuable time to help me whenever I needed it. The structure of the programme was very appropriate for the kind of learning and experience I was hoping for.

Community health cell as an organization itself is to be thanked, wherever I went I felt confident when I mentioned that I was from CHC. I felt the importance of being connected with so many organizations to make movements successful.

I have not had one uncomfortable moment at CHC as everyone made the experience feel like home and family. Even during discussions, sensitive social issues had been handled with great skill to ensure better understanding without an emotional lobotomy.

The CHC library has been of great help to me and I have borrowed books and kept it for weeks on end with and without Mr. Swamy's permission.

I thank Mr. Premdas and Dr. Rakhal for the sharing their wonderful experiences with us and for always being there to guide us.

I thank the office staff of CHC for bearing with us and for helping Sukanya make arrangements for us throughout the programme.

I thank my field mentors – Mr. Jayakumar, Mr. Shridhar and all the other members of Thanal, Trivandrum for giving me the wonderful opportunity to spend 6 weeks with them and to learn from their organization and their personal experiences.

I thank Dr. Shirdi, Mr. Ananthu, Mr. Pratap Agarwal and Mr. R Rajagopalan from Navadarshanam; Mr. Leo Saldahna and the other members of Environment Support Group; and Ms. Swetha N from Corporate Accountability Desk

I thank the authors of all the books I have read during the internship, as these are books of great value and have been written for a cause and not for money.

I thank my co-interns – Varsha, Sudha, Ria, Savithri, Lakshmi, Jeyapaul, Karibasappa, Sabyasachi and Sapna for the wonderful times we've had together, teaching me very valuable lessons and sharing their journeys with mine. The smile on their faces and the commitment in their hearts has been one of the driving forces for me during my internship. I wish them all the best and I hope to keep in touch with them in future too.

Learning objectives:

At the end of the 5 week orientation, the things I wanted to do during the next 6 months were:

1. To increase my knowledge on the various environmental issues and to learn about its link to various health problems.

2. To learn about and connect with various environmental groups and with individuals in this field.

3. To look into the various models of environmental education followed by schools and by NGOs.

4. To experience fieldwork in environmental health.

5. To understand environment as a dimension of health and health as a dimension of environment.

6. To learn how communities can get together to improve and protect their environment.

Orientation:

The 5 week orientation was the perfect way to prime us for such a programme. I felt comfortable with the group very early on the first day itself. During this time there were many sessions conducted as group discussions, talks by authorities in their respective fields and visits to some model projects.

Best sessions during orientation:

I personally enjoyed every session and there were so many things to learn from each session. But the ones that made maximum impact were:

1) The story of Malur by Dr. Ravi Narayan

He shared with us his experience about the health cooperative that was setup in Malur, Kolar with the help of St. John's Medical College in the 70s. This centre was initially successful and a lot of people were able to access healthcare at the cooperative hospital, but due to certain state and national level policy changes the village eventually turned from being productive and self sustained to a village plagued with desertification and debt.

Learning: One is not in complete control of his/her own health. A decision made elsewhere can lead to the death of a person far removed from it. Whatever work one may be doing, it is worth being observant to the happenings around the world.

2) Globalization by Dr. Thelma Narayan

One is often not completely clear on the concept of globalization and its implications. This session was very well laid out and brought out the main positive and negative effects that globalization has led to. Though it may have been started with a good intention, it has now resulted in greater poverty and also to further ignorance about poverty.

Learning: Any tool can be used for right or wrong depending on how it is used. On one hand the sharing of knowledge across borders is a boon but the increased exploitation of poor countries by the west has led to the worsening of the health situation. Now communities and forests and even countries often stand defenseless against the might of multinational corporations.

3) People's health movement by Drs. Thelma and Ravi Narayan

Both of them have been such integral parts of the movement from its initiation and hence it was wonderful to listen to the entire story, from why the movement was needed and how various communities from various countries came together for it.

Learning: Even in a democracy which is supposed to be 'for the people, of the people and by the people', communities have to make a lot of noise to be heard by the authorities. Such a situation calls for powerful people's movements and the PHM is one such example. Health being such a universal topic, the PHM is associated with many other social movements, supports them and is supported by them.

4) Indigenous systems of medicine by Dr. Shirdi Prasad Tekur

It is very rare to find a person who has internalized the various forms of healing. He is indeed an authority to speak about the pros and cons of each system. An allopath is usually skeptical of the practices of Ayurveda, Siddha, Unani and Homeopathy. Dr. Shirdi being an allopath himself is someone any allopath would be willing to listen out. The session clearly brought out the ideology behind each system and the scope each of them has. He also spoke of his experience with the army and with communities. He is also a teacher of spirituality and hence it added another interesting dash to the already interesting session.

Learning: No authority can decide what science is and what isn't. There many forms of science and one could learn a lot if open to these new perspectives. In a country like India, local systems should be encouraged and strengthened to ensure healthcare for all. The indigenous systems should be protected from the companies with vested interests in exploiting them for their knowledge.
Popular understanding on a subject can be created if a critical number of people are educated about it.

5) The Tribal Health Initiative experience with Dr. Lalitha

Doctors being there in the midst of a tribal community, being accepted by them and now even supporting them in livelihoods and agriculture was something very heartening to see. It was a great example of holistic community development. THI is a model project which can inspire many such efforts. Dr. Lalitha was involved with the project from its initiation and has seen it bloom to its current state. It was very inspiring to hear about her experience with THI.

Learning: Health centered community development models are a definite possibility. Through sustained and thoughtful efforts a community's destiny can be changed for the better. If the interest is there, one can get involved in avenues without prior experience or knowledge. Drs. Lalitha and Regi have been able to settle the hospital in the hands of

capable young doctors and nurses and now concentrate on issues of agriculture, marketing and livelihoods.

6) Personal experiences shared by Premdas and Rakhal

Both of them have a lot of experience working with communities in the areas of health and development. The sessions mediated by them were rich with personal stories and the wealth of knowledge they have. These sessions helped me a lot in opening up to new and broader perspectives.

Learning: The communities of rural India and also the urban poor face several demons every single day of their lives. Health apart, they have to worry about where the day's meal will come from. In the name of development, several million people lose their homes, jobs and lives each year. The term development has lost its meaning.

My learning at the end of orientation:

1. The magnitude of my ignorance. The sheer number of issues and the complexity of the situation and the difficult quest for possible answers.

2. The inappropriateness in attempting for change in a unidirectional manner. Almost all issues are inter-related and hence must be addressed simultaneously if results are to be expected.

3. The present education system is misleading and the information is inappropriate and inadequate. The education prepares children for the faulty dominant societal paradigm of development and hence it is a matter of great concern.

4. Witnessing the reality is far more powerful than telling about it.

5. However good a plan or idea may seem on paper, its actual worth will only be seen when performed on the field.

6. From my fellow interns and mentors, I learnt about unconquerable spirit, courage, commitment and laughter.

List of organizations visited and projects undertaken:

Thanal, Trivandrum:

Zero Waste Concept: visited Zero waste centre at Kovalam, attended GAIA conference on 'waste to energy' issues and read books from Thanal library.

Eloor Panchayat which is affected by industrial pollution: Read past reports, visited the area for a fact finding mission, worked on a compilation on Eloor reports and also wrote a report using data from Pollution Control Board.
Kasargod district - endosulphan affected community: read past reports, saw the documentaries shot at kasargod related to the issue of endosulphan and health effects, helped in preparing content for campaign website, visited the district where I met doctors to ask about present health situation and met government officials to learn about the Endosulphan cell and the relief activities.

Environmental education classes by Thanal faculty in Trivandrum schools: attended a couple of classes and learnt about Kerala State policy on environmental education.

Environment Support Group, Bangalore

Namma Raste, Namma Uru: This initiative questions the logic behind the government's operation to widen the roads as an answer for traffic congestion in Bangalore, involved in public meetings, gave presentation on health effects of road widening, took part in demonstrations against road widening activity, was a part of awareness raising campaign.

Navadarshanam, Krishnagiri:

Visited the ashram, learnt about self-sustaining community, Gandhian principles, learnt about some environmental education textbooks.

Community Health and Environment Skill Share:

Attended the workshop in Bangalore, attended another workshop at Cuddalore, was involved in the initial research for the Echangaadu school cognitive study, visited Jeeva at Chitradurga to learn about occupational health of manual scavengers, visited Bidar's Labor Union to learn about occupational health of unorganized workers.

Other workshops attended:

'Peas versus Pills' – diet for healthy living through veganism, Dr. Nandita Shah of SHARAN and Quiet Healing Centre, Auroville.

'The politics and science behind genetically modified foods' at Bangalore.

'Globalization and Bangalore' – a talk by Lata Mani

'Parliament of religions – pre-parliament summit' at Trivandrum

My experience at Thanal

Thanal is an NGO in Trivandrum working on environmental issues since the late 1980's and has had significant impact on the environmental movement in Kerala. They work on the following issues:

Zero waste and community livelihoods
Industrial pollution and environmental justice
Organic farming
Anti- GM campaign
'Ban endosulphan' campaign in Kasargod and are part of the relief cell
Active members of GAIA (Global alliance for incinerator alternatives) and IPEN (International persistent organic pollutants elimination network)
Environmental education

I spent almost 6 weeks with them – from july 30th 2008 to august 24th 2008, and between September 29th 2008 to 9th October 2008.

Zero waste:

The concept is a relatively new one and has been looked upon as the answers to waste related issues. Thanal came across this concept when they were challenged to give an alternative to setting up 3 incinerators at Kovalam beach which was being plagued by the wastes generated by the tourism industry. They worked tirelessly for 5 years to get the 'zero waste kovalam' project going. They have also setup a Zero Waste Centre at kovalam to create livelihood opportunities for the local women by using waste products as raw materials.

The concept of Zero waste involves trying to reduce waste generation to a great extent by re-analyzing the sources of wastes, improve waste segregation, re-use products, increase recycling, repair and rejuvenation. It also involves making changes at policy level to ensure producer responsibility to waste and also local government's role in the issue of waste.

It eliminates the need for destructive processes like incineration and land-filling. It is a far more efficient and economical process and can create a lot of job opportunities.

What I did:

I spoke at length to Mr Shibu and Mr Raju of Thanal who were instrumental in getting the process started along with the ministry of tourism of kerala and the local community of Kovalam. Their experience in relation to this was valuable. I also read 2 compilations on the concept of Zero Waste at Thanal Library to get a better understanding of this important concept. I visited the Zero Waste Centre and spoke to the women who were employed there on their experience at the centre.

Interviews with the members of the ZWC

It is a resource cum livelihood centre and also a training centre. The women in the livelihood groups report everyday and work on the production of articles using wastes generated by the various industries. There are three sections using the raw materials: used paper, used cloth and discarded coconut shell. This centre has been in operation for almost 6 years and the women have gained adequate experience to give trainings to other groups who ask for it. A nominal price is charged for it.
They receive orders from various organizations for cloth bags, coconut shell cups and utensils etc. They also take part in several local and national exhibitions and earn through them.
The women have also learnt a lot from the organization about environmental issues like organic farming and waste management. This centre is now a resource centre for other NGOs, officials and individuals to get a better understanding on the above concepts.

Another section of the ZWC concentrates on organic farming and a concept called organic bazaar. They have a few young persons trained in the principles and practical aspects of organic farming, who have now become resource persons and train local and regional farmers about the benefits of organic farming and help them to adopt the method. They also produce organic fertilizer and pest repellent at the centre which is available for the farmers. To further support the farmers growing organic products, a bi-weekly organic bazaar is conducted where local producers send their vegetables to

the ZWC early in the morning and are paid for it then and there. These vegetables are taken to Thanal's office premises in the middle of the city and are kept for sale. The bazaar has become popular in the area.

A centre for environmental education:

The premise of the ZWC is also used as a classroom for young children to teach the very important subject of environmental education. They are conducted monthly for the local children between the age groups of 10 and 16. Through the centre, Ms. Sujatha is conducting weekly practical classes on environment for children from 8 schools in Trivandrum. These classes have received a lot of appreciation from the children and the teachers alike. During summer vacations, a camp is organized for interested children which includes theory sessions, talks, discussions, field visits and practical exposure. These camps too have seen good success. At the centre there is some resource material like videos and books pertaining environmental education.

The GAIA meeting on 10th and 11th of august, 2008:

The global anti-incinerator alliance conducted a national meet at Tricandrum and it was also attended by experienced persons from England and Indonesia. The topics of discussions were:

Waste to energy: is it a solution?

This talk was about the technology of the Waste to energy concept and was analyzed in detail and was shown to be an expensive and ineffective solution for the wastes generated in India. Incinerators lead to the production and concentration of some of the most toxic chemicals like dioxins and heavy metals and the residual wastes from an incinerator eventually finds its way to a land-fill.
It is clear that even from a technological perspective that WTE plants are not the answer for managing waste, especially municipal wastes from growing cities in India. Certain processes like biomethanisation though can be explored further with regards to organic waste management.

WTE: A clean development mechanism?

This was a talk on the concept of carbon credits, the Kyoto Protocol and the WTO. It was clear by the end of the talk of how the west plans to continue polluting at the cost of developing countries.

India's stand on WTE:

India is planning to start several new WTE projects all over the countries despite the stiff protest and scientific reasoning. This talk was mainly on the politics behind the proposed projects. WTE becomes profitable only after triple subsidies from State Government, Central Government and carbon trading.
The central ministry for non-conventional energy is forcing states to adopt RDF and other WTE projects in their waste management agenda despite the fact of previous failures, high investments, high running costs and obvious ineffectiveness due to some vague arguments of WTE as a technology which is also in violation of Kyoto protocol. Carbon credits are being used as the primary weapon for fighting climate change.

Waste and livelihoods:

Livelihood issues are directly linked with waste management policies. This cannot be forgotten when such strategies are discussed as the waste pickers depend on 'waste' as their only source of income. They can be directly involved in opposing WTE. The waste-pickers policy will go along with the policy for zero-waste strategy.

A Coordinated nationwide campaign:

The points of consideration are that the groups will have to be in constant touch with each other and dedicate some time every week for the campaign against WTE. The groups will share information with each other and also reach out to other peripheral groups regarding these matters to strengthen the movement. The persons in charge of the various activities will try to stick by the deadlines to keep the process moving which will include preparing the FAQ, getting information regarding biomethanisation, the 31 proposed projects, about the subsidies available to each of the projects at state and national levels, about the past projects in India and about the technical arguments that will help the case here in India. The products for the EPR campaign will also be discussed and a co-ordinated effort will have to be made to get the full impact. The groups will have to discuss and agree on what the strategy of what they would convey about the alternate strategy 'zero waste'.

IPEN conference:

The international persistent organic pollutant network conducted an international conference at Trivandrum between 14th and 17th of August. The main topics of discussions were:

Stockholm convention and the COP-4:

The convention is for the gradual elimination of POPs and is a binding treaty for the various countries to follow. IPEN has been a mojor force in pushing for the elimination of several toxic chemicals all over the world.

Public perceptions on various environmental issues:

The information that popular internet search engines dish out on typing key words is very thought-provoking. More often than not, environmentalists come out as anti-nationals and villains due to the well portrayed web pages by coporations to discredit the environmentalists stand.

Heavy metals and nano particles:

When we have our hands full with issues of toxic pesticides, the issues of heavy metal pollution and lately of nano particle pollution are also coming to the forefront.

The Eloor Project:

Eloor is a panchayat near Kochi city and is on the banks of the river Periyar. Since 1946 it has housed around 250 industries which have created havoc in the lives of the local people's lives. The pollution caused by the industries affects the river, the air and the land of Eloor. It has affected their health, livelihood and culture drastically. A local group called the PMVS (Periyar malinikarna viruddha samithi) has been working since over 10 years to get some kind of regulation enforced on the industries to control the level of pollution which they have succeeded to achieve to some level.
Over the years several groups like Greenpeace, Thanal and the government have conducted studies at Eloor and they have all shown that the health situation at Eloor is very bad as compared to other areas. The evidence also goes to show that the pollution is the most likely cause for the poor state of health.

To further familiarize myself with the issues at eloor I read all the reports and studies conducted at eloor over the past few years. These include:
-1999 greenpeace report – chemical analysis around HIL
- toxic hotspots – greenpeace
- 2003 health survey greenpeace
- 2003 review on chemical pollution – greenpeace
- 2004 – biodiversity loss along the periyar
- 2005 – health survey – thanal
- 2005 Local are environment committee report to SCMC
- 2008 government commissioned health survey

To support the cause of the people of eloor, a fact finding team comprising of Dr. Romeo Quijano, Mr. Shridhar and myself went to Eloor to study the situation first hand and see what more could be done.

THE FACT FINDING TEAM'S VISIT TO ELOOR
August 17 and 18, 2008

Team members:

Dr. Romeo Quijano (Toxicologist, Philippines), Mr. Shridhar R(Thanal), Ms. Christine (Thanal), Ms. Bella Whittle (PANAP, Malaysia), Ms. Tinchu SK(Thanal), Dr. Adithya P (CHC)

Detailed Summary:

The fact finding team visited Eloor, Ernakulum on the 17th and 18th of August with the agenda to see the area, meet the persons involved in the campaign (Periyar Maalinikarna Viruddha Samithi), and understand the problem in better detail, to see how a strategy can be evolved to help the campaign.
We were welcomed cordially by the PMVS members including Purushan, Anwar, Kunjappan and Sakkir. The initial meeting took place in the Clean Development Project office.
From the discussions it was clear that the PMVS had fought, along with the community a long battle which has met with some degree of success, but even then the industries still continue to pollute, and the Pollution Control Board and the related government bodies turn a blind eye towards them. The PMVS itself is a close knit group which is very dedicated to the cause and have worked with the help and support from groups like Thanal. They showed us the photographic evidence of the pollution of Periyar and of the effluents the industries dump in the river. The media has been actively involved in the Eloor campaign and this issue is still being featured quite regularly in the papers. The discussion moved on to aspects regarding the orientation of the industries in relation to the clusters of the houses in Eloor, and the position of the river with respect to the landmarks. Also certain details about the previous studies done at Eloor were discussed with them for more details.

We visited certain industrial sites and also various points of the river and its branches which flow along the industries and the homes of people downstream. The various sites provided us with the diversity of smell and colour the industrial wastes had to offer. The Kuzhikondam Creek has been a site of excessive toxic dumping which had thick smell of Ammonia, sulphur compounds, BHC and had oily residues floating on the water and staining the sidewalls of the creek. When the bottom sediments were

disturbed it brought out a new colour and smell to the water and air respectively. We also saw the frustration of the locals to the appearance of another team that has come to Eloor, that too with persons from abroad, and the young men openly voiced their dissent to it. They had indeed fought a long battle and they felt that such effort would prove futile and just a waste of time.

We visited certain sites where the wastes from the Hindustan Insecticides Limited were being dumped and there was a clear smell of BHC along with other chemicals preset in the air. By then, most of us very experiencing mild headaches and Dr. Romeo had already experienced nausea when he took a deep whiff of the creek sediments.
By the time we got back to PMVS office, we had seen the wards which were affected and the various sites of the polluted Kuzhikondam creek and the Periyar River.

The orientation of the houses, the industries, the river and the effluent movement were better understood by Dr. Romeo and the team by then. Certain other queries regarding the wind directions in relation to the clustering of houses is yet to be understood by further discussions. By dusk, we had also heard of the various struggles and the cases which had been fought against the polluting industries and by then we were really wondering about what more is left for us to do. The situation is indeed very difficult. The few successes they have had were when the LAEC (expand)was in force between 2004 and 2006, and also the supply of clean water to the communities of Eloor. Few industries had adopted cleaner technologies but most of them have evaded the law through unscrupulous means. Also a local Pollution Control Board was setup at Eloor. The chemical monitoring of the creek and the river are being done on a monthly basis for various parameters like toxic by-products, heavy metals and other chemicals indicating the pollution. These reports show the elevated levels of poisons in the river and hence Dr. Romeo suggested that we take a copy of all the chemical investigations that have been conducted on the river, put them in a database and analyse them. Also we learnt that Purushan and his close friends have considerable influence with the local community and also with the Govt authorities involved.

On day 2 of the visit, we saw a few patients at Eloor who had chronic conditions and had lived in Eloor for a long time. Cases included maxillary sinus cancer, breast cancer, rheumatic heart disease, repeated upper respiratory infections and vague myalgia and arthralgia. Though individual cases cannot be correlated with the presence of industrial toxins, the high prevalence of these cases in this area would definitely point to it. But few conditions like myalgias have been associated with cadmium toxicity and therefore, it may have to be explored with blood tests and further study. The local doctors have been very vague in tackling such cases so far.

We also visited the Environmental engineer, Mr. Farooq Shet at the local Pollution Control Board office and had a brief chat with him. Though perplexed with the whole situation of being confronted with an international delegation and understandably

trying to push the questioning to the municipal secretary, he did come out with a few points and acknowledged the fact that industries were polluting Periyar and Eloor and the life they housed. He requested not to be quoted and also to meet his superiors as things were really out of his power. Though he has issued for the closure of HIL a few times, it has not happened. When asked about his opinion if the chemicals were affecting the health of the people of Eloor he again requested us to spare him the agony and to ask his superiors about it.

After that, we visited Dr. Indira, Head of Dept of Community Medicine at the Co-operative Medical College, Kochi. She was involved with the drafting of the Govt health survey questionnaire (July 2008), through a Govt order. She was not directly involved in any other way. She was quite unaware of the pollution situation till she was called upon for her services, since she was in Delhi till recently (2003). She seemed a little ambiguous about her understanding of community medicine and toxicology and stated that her area of interest was restricted to mother and child welfare, and that her involvement in the survey was not out of interest but due to lack of personnel. Even though she accepted that the methodology of the survey had its shortcomings she was not ready to accept any criticism about it because the report was *as good as the team she was provided with*. This, according to her was the best that the given team could produce. She also made it a point to highlight that she is in support of the issue but her involvement would be restricted by her age and health and the fact that other doctors are also ignorant of such issues and the link with health problems. She was also negative about the possible involvement of the other doctors of the hospital in this campaign. Since her experience at Kochi has been limited she suggested we should speak to other doctors too about this.

That evening after bidding goodbye to the PMVS, we headed back to Trivandrum. The next morning the fact finding team met at Thanal along with Jayan and Usha to discuss the findings and the opinions on how to move forward from here on.

Some of the key points of the discussion back at Thanal were:

A database/spreadsheet has to be prepared with the information available from the chemical studies conducted on a monthly basis by the pollution control board. After that, mathematical deductions, pictorial representations and graphical comparisons can be made with the relevant data.

The previous health surveys should not be discredited, and the information available there has to be looked into carefully and new conclusions can be drawn from them. The information can be studied aggregate wise/disease wise/ward wise etc for a better understanding. This will help decrease the confusion with so many numbers around.

Another approach that should be used is to collate data on the quantity of exposure - high exposure, moderate exposure and low exposure. Dr. Romeo suggests that the control population of Pindimana can be used as the population with 'low exposure'. For this, individual diseases will have to collated with the ward, the location with respect to the tainted factory(upstream/downstream to the factory) and other considerations like wind direction in cases of respiratory diseases. This 'dose-dependent' study itself can further validate the fact that the ill health in Eloor is due to the polluting industries. Hence it is of importance.

A master report should be prepared with the information from all the existing reports. The confounding data about the high chemical pesticide use in Eloor households will need looking into, but Dr. Romeo says that the factor is too trivial to be used for counter argument.

The issue of empowering and mobilising the community was discussed next. Dr. Romeo feels that the community are not involved enough and that people like Purushan can do it, though more women need to be involved. Some of the suggested strategies for this were the conducting of medical camps with interns and young doctors where the people will receive treatment and also get more educated about the issue and how to get involved. Training of local health workers to treat minor ailments and also to empower and mobilise the women of the community is also to be considered. These methods would provide a sort of immediate and temporary relief to the affected persons there. The local children can be informed and empowered with health and environmental education. Dr. Romeo also mentions the importance of making it a membership based campaign where more people are to be recruited and more leaders are to be identified.

The local doctors' community can eventually be involved once all the data has been collated and some kind of a workshop can be conducted for them regarding the toxics issue and the diseases that are caused.

Biological monitoring in the community with certain plant and fish species has also been suggested.

There was a suggestion of conducting blood tests for levels of chemicals and heavy metals and compare with the standard levels. Once it is shown that levels are high, the authorities can be forced to take over and address the issues.

Also a proper epidemiological study can be done with the agenda to prove the extent/burden of the diseases, by trained medical personnel.

Immediate things to be done:

The spreadsheet has to be prepared showing the relation between chemical levels with time is to be prepared. Details regarding the actual method and format of entry are to be discussed further.
Few details of cadmium and other chemical toxicity on health are to be looked into, in relation to how the testing process would proceed.
The collation of the existing reports can be started.

My involvement with the report:

The studies which have been done at Eloor over the past 10 years have been collated into one report; deductions and comparisons have been made looking at data from the various reports in relation to the links between the poor health of the people of Eloor with the pollution occurring there.

The reports have been attached in the annexure.

Also, we received some river pollution monitoring data from the Kerala pollution control board which I have analyzed. The results show clearly that the monitoring techniques are highly inadequate and that most of the safety standards are not met.

This report too has been attached in the annexures

Learnings from my involvement with the Eloor project:

There are many such rural communities all over India which have been marginalized by industrial pollution. The pollution causes several short and long term effects. This includes adverse health effects, damage to livelihood and to local environment. The pollution control boards are hand in glove with the industry and hence there is never adequate monitoring and regulation of the activities of the industry.

The visit to Eloor with experienced persons like Dr. Romeo and Mr. Shridhar were very beneficial to me. The learnt the method to approach a pollution impacted community and how to look for the various factors that could be compounding the effects of industrial pollution on the local people. This was also my first experience in writing a report.

I learnt about the various provisions in our constitution to safeguard our air and water and also the regulations for the establishment of industrial complexes. There are several standards that have been laid by the Central Government for the regulation of the pollution levels but most often these standards are not met with.

The locals have become tired of demanding for their rights. They are now quite skeptical about any improvement. They do recognize that the health problems at Eloor are due to the pollution.

Epidemiological studies of good quality are essential in such areas but very often they are not good enough tools to get the point across. It then becomes difficult, because how else can one prove the obvious point of the effects the pollution is having on the health of the residents of Eloor.

This system of needing to prove the hazards of industrial byproducts is wrong in itself. Why should the public bear the burden of that? Shouldn't it be the job of the industry to demonstrate the safety of its operations? Why then does such a situation exist?

The price of the subsidies the industries receive is eventually paid in medical care by the poor residents of industrially polluted neighbourhoods.

(you can add the chemicals report after this , also number the annexures, so it is easy to refer)

My visit to Kasargod

Kasagod is the northernmost district of Kerala which borders Karanataka. Since the 1970s the residents of Kasargod had been exposed to the hazardous pesticide called endosulphan which used to be sprayed from helicopters over cashew plantations. The villages skirting these plantations also received the full dose of the chemical. There had been various health problems faced by the people due to this chemical – cancers, birth defects, neurological problems and endocrine disruption being the common effects. In 2002, the high court issued a ban on the use of endosulphan in Kerala. Since then, certain relief activity has also taken place there. A government approved cell called the endosulphan cell has been instituted in the zilla panchayat office in Kasargod. My objectives were to get a better understanding on the history of the endosulphan issue leading to the ban of the use of the chemical, learn about the functioning of the endosulphan cell and speak to the victims and families on the relief activities that have taken place. For this purpose, I read all the reports written about the issue, the newspaper articles, and the health surveys and also saw the many movies made about it. I finally visited Kasargod between the 15th and 19th of October, 2008.

The details of my findings are in the report titled 'The situation in Kasargod' in the Annexure.

My learnings from the Kasargod readings and visit:

Despite the overwhelming evidence, the ban was given through precautionary principle. The WHO declares this chemical as an extremely hazardous chemical. How difficult is it to prove that the health effects are due to the chemical? Logic would say without doubt that it is. Epidemiology may indeed be a weak science, giving the violators of environmental law a free hand in whatever they want to do.

Even then, this is the first time an order of this magnitude has been given in India and is therefore of great significance. The relief measures are also one of a kind.

This issue taught me the harm that can be caused by man made chemicals to the health of people and other creatures and to the environment. And yet, we introduce hundreds of new chemicals into the world every year.

Namma Raste initiative

Bangalore over the last few years has seen 'growth' at a very high rate. The city has literally boomed in the recent past. The result has been many including the major issue of transport. The roads have been getting more and more crowded with vehicles, more cars and bikes, which has lead to the congestion of traffic. To combat these issues, the BBMP in its wisdom has decided to widen all the roads of Bangalore as an answer to slow moving traffic. The project has been thus:

It covers a 400 km stretch in 140 key roads in Bangalore costing Rs. 24,000 Crore according to current estimates.
The road widening scheme plans to cut a total of 40,000 trees in Bangalore.
It plans to break 50,000 established shops like the ones on Avenue road etc thereby destroying livelihood and also places with historical significance to Bangalore.
It plans to break many thousands of houses along many of the roads.
Footpaths and green spaces along all these roads will be severely affected.
The plan is in direct violation of the Town Planning Act of the Constitution.

Because of all these points, a Public Interest Litigation was filed against the project, following which the project has been halted and a committee has been set up to review the project.
Even then, the government continues to allow the tree-cutting and road widening to continue which is illegal and in direct violation of the high court order.

But the chairman of the committee has not heeded to any of the reasoning of the NGOs and has made a statement saying: "if you want metro and good roads, trees have to go".

The issue is that the concerned citizens of the network Hasiru usiru are neither against the metro nor to commuting, in fact they have proposed much better plans for

improved connectivity in Bangalore. But the City corporation refuses to understand that road widening is not the only solution, and the fact that it is not a solution at all. Such projects have failed miserably in every city worldwide where such measures have been tried. Those cities realized their mistakes and then resorted to other measures.
After all, how much and for how long can you keep widening roads?

The merits and demerits of the projects are thus:

Merits: a temporary solution for the ever increasing traffic of the city (but it is expensive and the vehicles which will saturate the widened roads soon).

Demerits:

Loss of green-cover: The micro-climate of Bangalore has already changed dramatically over the past few years. It can be directly attributed to the rapid loss of green cover and the increase in vehicular pollution. This will further deteriorate with the project. A predicted rise is of 3 degrees.
Loss of health: There are studies which show the dramatic increase of patients with asthma and allergy over the decades and it is almost 30% among the children of Bangalore now. That is an outrageous statistic.
Loss of pedestrian space: There will also be reduced pavement space which will discourage people from walking (the best way to commute) and also increase the chance of pedestrian accidents. Already Bellary road has seen 22 deaths over the past 2 months following the Road widening.
Loss of livelihoods: The shops that would be destroyed and also the livelihoods of the pavement vendors are all under threat.
Loss of residence: It would be difficult to understand this but it is of importance that we do. Just imagine people wanting to demolish your house for this project. Would you like that?
Loss of landscape permanently: if the trees and cut and the shops broken down, it can never be returned to its former self. It would be a permanent loss.
Heavy investments for nothing: All this money (24000 crore) that will go into this project can be used far more productively to improve the traffic situation in Bangalore.
I did attend a workshop where the alternatives were discussed and it was clear that road widening was not an option.

The public workshop to educate about the road widening and metro rail projects:

In July 2008, a workshop was conducted by *Hasiru Usiru* to educate public about the projects and also to evolve a strategy to counter it. I was invited to speak of possible health hazards of the projects. I read the project proposal and researched on the internet for information and it showed that many negatives effects on health can be expected.

I have attached this presentation in this annexure.

Since the initial public meeting, I have been involved with the *Hasiru Usiru* network to educate more people about the faulty projects and also in two public demonstrations which were conducted. One was a walk from Lalbagh west gate (which is to be destroyed for a metro station) to Townhall. The second demonstration was at Townhall to reiterate our position on the project. I also visited high court to attend an *adalat* to sort out the issue of the committee not listening to what *Hasiru Usiru* was saying.

About ESG:

Headed by Leo Saldhana, they are a very dynamic group working on a lot of environmental and social issues. Almost 10 years since their conception, they have worked on urban planning, environmental education, industrial pollution and protection of green spaces.

My learnings:

There is inadequate understanding in the Government on how to solve issues. But there is also inadequate understanding amongst the public. Most people have a single dimension approach to look at them. Here for example, the width of the roads has been looked upon as the problem but in actuality, the problem is the increasing number of vehicles on the road, poor public transport and inadequate encouragement to cyclists and pedestrians.

The government will not think twice in violating court orders. It is up to the public to take the government to court again in such a case. There is a requirement for constant monitoring of government action.

This issue gave me a great deal of understanding on development projects in general. There is seldom any consideration for the people who will get affected by them, which usually means lakhs of people.

The number of people who are to be affected by the project is around 2 lakhs. Even then, just 500 people came out to protest. Most people will not realize the threat until the bulldozers come in front of their shops and homes.

The CHESS workshop and occupational health

CHESS - 3 workshop at Bangalore

This was the fourth time that this workshop was held. The CHESS workshop helps groups working on environmental and occupational issues to get a better understanding on health, basic epidemiology, health rights, primary prevention and health advocacy and the health professionals to get a better understanding of health impact of environmental and occupational hazards. (Refer to the Health Action article on CHESS)

In this workshop, the focus was on occupational health. of organized and unorganized workers. Representatives of groups working with people employed in the agriculture, mining, manual scavengers, domestic workers, garment industries, plantation workers and stone cutters; and also had communities affected by industrial pollution.

Labour unions and groups working on issues faced by workers seldom consider health to be a priority issue. Through this workshop they realized the importance of occupational health and safety, the responsibility of the managers to ensure occupational safety and also about the government schemes available to workers for medical compensation, advocacy and relief. I got to learn that the conditions in workplace are pathetic and there is absolutely no regulation taking place. The workers are completely unaware of their rights and continue to live in ill-health and poverty. It is this poverty that drives so many people to do dangerous jobs.
(more reflection /reporting is necessary – the 2 day training on occup health !)

CHESS workshop at Cuddalore

Cuddalore is a town almost 25 km from Pondicherry in Tamil Nadu. It houses an industrial complex called ? which has created a lot of problems for the village communities surrounding the ……. Since 6 years,volunteers from some of the villages with the help of Corporate Accountability Desk of Chennai have started a process of community environmental monitoring using simple tools to make regular notes of the air and water pollution in the area surrounding the factories. This process of monitoring has been used by them to prepare reports to improve regulation of pollution in the area. The level of pollution has decreased in this area to a significant extent though not fully. This was a 2 day workshop for communities from Trichi and Nagapatinam which are also being affected by industrial pollution from a cement industry and its associated mining (is it quarrying/sandblasting ? – verify with Shwetha) and oil drilling respectively. They wanted to learn about environment, health and community

monitoring. It was dealt with in simple language, communicating the importance of health, of the need of a clean environment for good health and sharing of experiences with community monitoring as an advocacy tool.
There was also a tour around the ……industrial complex to give us a taste of what they get everyday. The odour is nauseating, strong and persistent. The local primary school is also located in the proximity of this complex. Despite the strong efforts and persistent protests from the community environmental monitors, the companies still continue to pollute . Most of these industries are Chemical industries (including Pharma companies which portray themselves as providers of health while they are severely affecting the health of communities around the factories.

Follow up after the CHESS workshop

Some groups have shown interest to include occupational health in their agenda after the workshop and have asked for CHC for assistance. One such group was Jeeva of Chitradurga which works with manual scavengers. Since one of my interests was to explore issues of occupational health, I decided to go there and interview the group. This interview I have attached in the annexure. You add a separate section on the Chitradurga visits , also the field project work and keep the interview and the fgd notes in the annexures.

Bidar :

My Learnings through CHESS:

Many groups working with labor unions and communities affected by industrial pollution have little understanding of health, especially occupational health. The approach adopted in the CHESS workshops has helped these groups understand these issues in much better light. Using occupational health rights and rights to a safe working environment will help these groups put pressure on the factory owners to improve working conditions.

Simple techniques like Area map and body mapping can be used effectively by groups working with unskilled and semi-skilled labourers to understand the dangerous effects their work and workplace can have on them through their own knowledge. Also, different groups share their experiences with each other which strengthen the support structure and networks. Successes or failures seen by a group can be an important learning for another group.

Each type of work has its own set of occupational health effects. The ones who are most affected by these are the ones working at the grassroots. The poor are kept poor by low wages. They don't demand safety measures and are willing to do risky jobs. The factory owners use this to their full advantage.

There is also inadequate understanding on provisions like the Factories Act, the ESI Act and the Workmen's Compensation Act. These too were introduced through the workshop. There are a lot of provisions that labour unions can use.

Health Communication workshop by Dr. Mohan Deshpande:

This was a 3 day wokshop conducted for all the fellows at the Community health cell. Dr. Mohan has over 20 years of experience working with rural communities in Maharashtra, Gujarat and Rajasthan. He has simple yet beautiful techniques to communicate health information to communities. He lays great importance on song and music as a medium for health communication. We were expected to perform songs, drama and picture stories as a part of the workshop which helped each of us come out of our shell to express ourselves.

Peas versus Pills workshop by Dr. Nandita Shah:

This is a one day workshop covering various issues. In effect it is about health, nutrition, allopathic medicine and veganism. She presents a lot of information and evidence which shows the many positive and few negative aspects of a vegan diet in improving health in a holistic manner. She is a part of SHARAN and Quiet Healing Centre at Auroville.

There are many sources of information, some more than mere information, some which could give you close-to-actual-experience kind of a feeling. Books and movies played a major role during my internship and these are the reviews of the books I read.

Books:

1. The One Straw Revolution - M. Fukuoka

Masanobu Fukuoka was a microbiologist in his youth. Through some experiences he decides to give up his career and take up farming. He put to practice a method of farming he calls as Natural Farming or No touch farming. It is a technique he has mastered through years of trials; using no modern implements and very few inputs he has been able to produce more than farms which use chemicals for production. His principles in farming reflect his philosophies on life which are mainly derived from core Buddhism and Taoism. The words just flow throughout the book and at no time does it seem heavy with philosophy. It is indeed a delightful read for anyone.

It primes a process of questioning, which is the basic step towards understanding the truth. One may not be able to immediately agree with or appreciate whatever he says but with time it would all seem to make sense. This book is especially useful for those

working with agricultural communities to get a better understanding on holistic healthy farming.

2. The Limits to Growth - Club of Rome

This book was written in 1972, a few years after the environmental movement began. The authors were renowned professors and development experts from universities like the MIT in the U.S, who studied the trends of growth and consumption patterns. They then extrapolated these values, played around with it, made optimistic assumptions in the development of cleaner and more efficient technologies in the future and using these various scenarios came up with predictions for the next 30 years and the next 50 years. The book is both technical and philosophical. It is rich with graphs and tables which portray their findings, but the highpoints of this great book are the interpretations of the findings and the conclusions. At the end of the book the authors pose questions on what the word development and growth mean to them and how growth can be achieved even in an equilibrium world which was a very interesting perspective.

The language in the book is very light and the explanations are simple enough. It is a book that can be enjoyed by anyone, from high school kids to retired persons.

3. Silent Spring: Rachel Carson - 1962

Believed by many to be the initiator of the modern wave of environmentalism, this book is a landmark publication which attempts to unite science, ecology and the truth of inter-dependence. With detailed research, Carson goes on to prove without doubt about the terrific dangers of using chemicals in agriculture and industrial processes. With the detailed research to support her claims she also explains how chemicals may completely alter the course of all the life-forms on the planet through mutations, cancers and endocrine disruption.

This book also led to environmental advocacy. This may or may not have been the intention of Carson but is has inevitably led to the same. The followers of deep ecology have termed this as an unfortunate and seemingly unexpected outcome of Carson's work which has led to the further commoditization of the environment. Even then, for a reader who is not much aware of environmental issues it is still a great read and is of complete relevance even today.

4. The Anil Agarwal Readers: volumes 1, 2 and 3 (Former director of CSE India).

These books are a collection of articles which Anil Agarwal had written in a column for the Economic Times in the early 90s and for his magazine called Down to Earth. They reflect issues on environment, economics, development and politics. Absolutely brilliant

views, great reasoning, and he offers probable solutions to current environmental and sociological problems. He was actively involved in several public meetings with top Government officials but his advice and reasoning mostly fell on deaf ears. Despite that he was active in his pursuit until he died of cancer in 2002.

5. Caterpillar and the Mahua Flower - Tremors in India's Mining Fields.

As we sit comfortably at home enjoying the comforts that modern life has to offer, the tribals and villagers living around forested areas face a major threat to their very existence. Forested areas have a major problem due the rich ores their soils contain.

The power of the corporate and mining lobby, the government's handicap and the destruction of the environment and livelihoods of poor people has been shown in vivid details in this book. It is a book about reality in rural India which we cannot see because of 'Shining India'.

6. Our Planet Our Health - WHO (1990)

This was an important publication by the World Health Org where they explore the various connections between environment, development, industry, policy, pollution and health and conclude reasonably that a majority of the health problems can be solved if basic needs are met and the environment is protected and preserved. It is now clear that romantic environmental activism is not a very effective tool unfortunately. Hence an alliance between the health groups and the environmental groups is inevitable if some improvement is to be expected.

7. Textbook of Environmental Education - R. Rajagopalan (Oxford publications)

The author is a trustee of the Navadarshanam foundation. The books are unlike any textbooks I've seen. The layout is in the form conversation between children who actually explore the world and realize the importance of various aspects of the natural world. They understand the interdependence of all living creatures and with nature. They also realize how human presence and activity affects various systems and processes, and how they can work individually and a group to help preserve and protect the world. The one written for undergraduates is called - "Environmental studies - From crisis to cure", which is a must read.

If there was any book children should read, it's probably these textbooks.

8. Ecological visions - 1989 (out of print)

This book is a collection of articles and essays from various environmental activists, scientists and reports, written almost 20 years ago, but have complete relevance even

today. The articles range from discussing concepts, major environmental happenings, harmful technologies, eco-friendly alternatives, practically proven methods, quotes etc.

One particular author caught my attention - Ms. Hazel Henderson. The language and the understanding shown through her writing is captivating. She is the author of 'Creating alternating futures' and 'Politics in the solar age'.

9. Hind Swaraj : M K Gandhi - 1908

This is the book that made people describe Gandhi as the greatest anarchist of the 20th century. The book is in the form of a conversation between a confused and hot-blooded youth with Gandhi and through detailed reasoning Gandhi goes on prove the strength of non-violence in the truest sense. Non-violence in its deepest and holistic sense has been explained here and this is a very important concept to understand.

10. Chaos - James Gleick

This book was written in the 1987 and has the description: "The making of a new science". Indeed, anyone who reads this book will concur with what Douglas Adams has to say after reading it "It feels like someone just found the switch to the light bulb". But what I found most interesting about the book was not just the scientific explanation for chaos, dynamic systems or geometry of nature (which themselves make a fascinating read, with the many humorous overtones); but it was the fact that how we become restricted by our foundations in our thinking and the way we look at the world. The sciences we are taught in our schools forms our foundations and it would be difficult to think outside the box with that background. That's why it is the foundation that one should work at, as everything else gets built on it. As is said in a line in the book "Over time, physicists have learnt how to ignore chaos". This can be generalized to the public and the government regarding many issues including the environment.

11. The Paradox of Environmentalism – York University Symposium 1983

This is the book that took me to the deepest of depths in understanding the meaning and implications of being a nature lover. It dwells into history of the environmental movement in a very critical way, they discuss the change in ideology and objectives over the decades, then they discuss the role of media in informing and misinforming the public and finally they discuss "Deep Ecology". This is a concept of paramount importance and is reflected in the teachings of the Buddha and Gandhi. Arne Naess is the one who has laid down the deep ecological principles. It revolves around the biocentricic perspective. One can look at human health from a totally new light after familiarizing with these principles.

12. Environmentalism – A global history – Ramachandra Guha

Before looking ahead one must look at the history. This book was unlike any history book I've seen. It discussed transition of ideas rather than just dates and events. The various approaches that have been used to look at environmental issues throughout history have been discussed. World Bank in 1945 to the developing nations: We are here to help you enjoy the material benefits on an earth infinitely blesses with natural resources.

13. A citizen's agenda for zero waste – Paul Connett and Bill Sheehan

Incineration and land-fills are a dead end. The only possible solution to waste is to make use of waste as a raw material for industry. The perspective is called "Creating wealth from waste". Responsibility is shared by the community, politicians and industry to ensure zero waste. The paradigm is also to move away from 'managing waste' to 'eliminating waste'.

14. Compilation on Zero waste: Thanal

This compilation contains several essays by various authorities on zero waste. There is clear explanation on the concept of zero waste, with a lot of examples from around the world on how zero waste strategy is being implemented.

15. Publications of Pesticide Action Network Asia Pacific:

- Warning! Pesticides are dangerous to your health:

It deals with the chemistry and consequent health effects of pesticides. It also contains a questionnaire to monitor effects of pesticides amongst farmers who use it regularly.

- Profits from poisons:

It demonstrated the vicious debt cycle the farmers get into once they start using pesticides which eventually leads to suicide.

- Hazards of GM foods:

The science behind GE is still incompletely understood, despite that it has found its wasy into or food and also our environment. The gene pool is now threatened with engineered genes.

Movies/Videos:

1. Story of stuff - Annie Leonard.

This video is available at www.storyofstuff.com. It is a brilliant video which takes us through the actual journey of the things we buy at our local store, where it comes from and what its fate is after we dispose it, through animation. It is just 20 minutes long but a must watch, because everyone is a consumer. This video is the improvisation of a PowerPoint presentation which she had made earlier.

2. Earthlings

Coming face to face with violence is not something people want to do, even then they don't mind being part of it if it doesn't happen in front of their eyes. Commentary given by Joaquin Phoenix, this movie takes us on an amazing journey about the amazing thing called life, but also shows what horrors take place regularly in our world, things that don't happen in front of our eyes, but things we should know, because only when we see and only when we know can we make an informed decision and protest the wrongs. Violence is given a new definition through the realities shown in this movie.

3. Bhopal victims

The movie highlights the ongoing protests taking place in Bhopal by women of the affected communities to demand safe drinking water and for the remaining chemicals to be cleaned up. It is strange and sad how they need to demand for such basic needs even after 25 years of the tragedy.

4. Sprays of misery:

This movie and the other movies like 'Endosulphan – the silent killer' contain very good accounts on the issues at Kasargod. There are many interviews of the local doctors and victims to improve our understanding on the subject.

(Can you mention if you have accessed them for CHC Library and Information centre CLIC- as a foot note: will help for future reference)

Annexure

Health Aspects
related to the road widening scheme

Dr. Adithya P

Community Health Cell, Bangalore

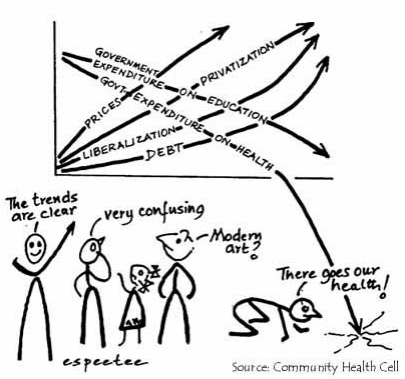
World Health Organization defines **Health** as:*

'A state of complete physical, mental and social well being, and not merely the absence of disease or infirmity'

Humans are social beings.

Factors affecting Health:

Social
Political
Economical
Cultural
Environmental



(* - Textbook of Preventive and Social Medicine, K. Park)

Health being so integral to every subject, how to understand the health effects such a scheme?

The **benefit** of the road widening is a short term smoother flow of traffic, coming at what **cost**?

Health effects can be looked at from the perspectives of:

1. Pedestrians
2. Drivers
3. Vulnerable groups
4. General public

Who and how?

Around 15-20% of all people in Bangalore commute by walking most of whom are daily wage earners.*
These 'Transport challenged people' will now be forced to use public transport leading to compromises on basic needs.*

Pedestrian accidents leading to death:

*2004 - 390
*2005 - 368
*2006 - 463 out of 800.**

Pedestrians are at a higher risk for accidents including fatal ones.

Elders and children constitute a significant 16 per cent of pedestrians killed in road accidents.

Therefore, on further compromising the side-walks, the number of pedestrian accidents will only rise. Most of them being earning members, will lead to loss of livelihood and hence health of their families too will be affected.

(* -DH - 14/6/07,Hindu – 24/10/04,** -bprd.nic.in/writereaddata/presentation/File20.ppt)

Loss of Green cover along the roads:

Trees help by:*

1. Providing oxygen and purifying the polluted air.
2. Absorbs noise from vehicles, therefore reduces noise pollution.
3. Maintains temperature of the city, improves rainfall.
4. Drivers usually slow down on tree-lined roads, because of cooler atmosphere. Provide shade for pedestrians and motorists.
   The green colour of trees itself is a relaxant to the strained eye muscles.

By encouraging motorization and cutting trees:

1. Respiratory conditions like Asthma, Allergies and Bronchitis increase**

2. Allergic disorders of eye, chronic diseases, fatigue.

3. Affects children's health more, because they breathe more than adults and are also more active (high incidence of Asthma among urban children)**

(* - www.treesforfree.org, ** - Asthma and pollution- Dr. George D'souza, SJMCH)

Bangalore and asthma

Year	Prevalence(%)
79	9
84	10
89	18
94	24
99	29

(Asthma and pollution- Dr. George D'souza, SJMCH)

Bangalore & Asthma(Children)

Group		n	%
I	Heavy traffic affluent	3722	19
II	Heavy traffic less affluent	273	31
III	Low traffic affluent	2565	11

(Asthma and pollution- Dr. George D'souza, SJMCH)

Stress:

- for pedestrians- because of inadequate foot-path and risky conditions*.

- for the Elders- will find it difficult to cross the broad roads with fast moving traffic. Sky-walks are of limited use for them. Also for handicapped persons.

-for parents whose children walk or cycle to school.

-Physical stress, due to the heat leading to dehydration.*Loss of tree cover increases exposure to sunlight also.**

-These lead to easy fatigability, frequent headaches and poor work efficiency.

For motorists – as they drive faster, it demands more concentration and skill***.

Such conditions also increase chance for accidents.*

(* - Textbook of PSM – K. Park, ** - nativeremedies.com,*** - safespeed.org)

Encourage **Positive health** by improving side-walks and tree cover:

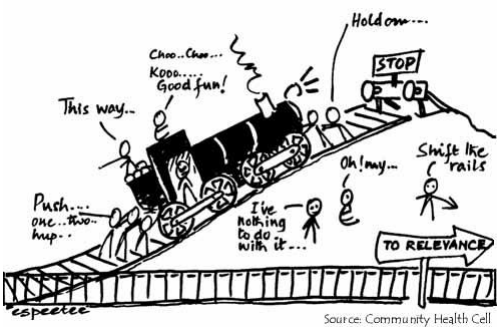
Good tree-lined sidewalks will encourage more people to use them, there-by improving health – *

Staying fit physically and mentally

Better air quality

Decreases blood pressure

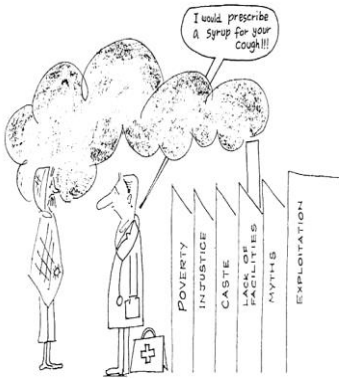
Decreases blood-sugar levels



Source: Community Health Cell

(Textbook of Preventive and Social Medicine – K. Park)

Looking at these health effects from the current model, it is clear that other methods have to be introduced for addressing the traffic problem in the city.



More long term and sustainable methods should be looked into.

These could start from state policy and implementation level,
city planning level. Such decisions may seem drastic, but that's what the situation calls for.

Many people want to walk, many have to walk. Walking is, after all, the most sustainable mode of commuting. Therefore it should be given as a choice for mode of communication.

(www.sochara.org)

A comprehensive compilation and analysis of the studies conducted at Eloor and the river Periyar

Thanal

Dr. Romeo Quijano Professor, University of the Philippines Manila, and President of PAN Philippines

Dr. Adithya P, Community Health Cell

Background information:

Eloor is a panchayat in the district of Ernakulum, Kerala, just 17 km north of Kochi city. The river Periyar, the main river of Kerala flows by this village and had been the important source of livelihood and food for the local people. It has been called the lifeline of Kerala.

From the last 60 years the lives of the people of Eloor has been infringed by an ever growing number of factories near their village which has, with time, affected all aspects of their lives. The industries have used the river and the surrounding land as dumping grounds for all the wastes they produce. Since most of the factories here produce

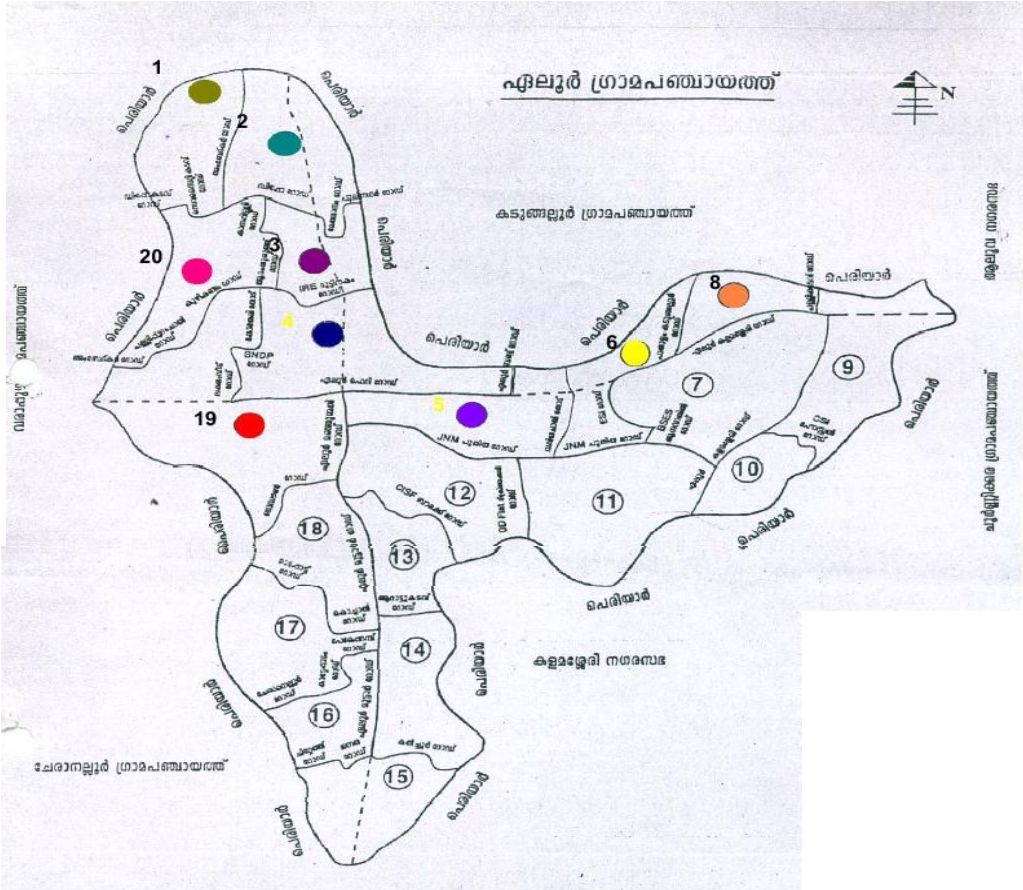
chemicals, there has been large scale dumping of toxic chemicals at Eloor and Periyar. These have taken their toll on the fishes in the river and the people and animals at Eloor. There has been a constant struggle by the local community to enforce regulations on the pollution created by the factories but their pleas have been falling on deaf ears. Despite several efforts no strict norms have been followed and the pollution continues almost unchecked. Nothing has been spared - the air, the water or the soil.

Several groups have conducted chemical analysis and health surveys at Eloor and have found alarming results but this too has not pushed the Pollution Control Board to take any action. The regulations are being blatantly violated by the industries all at the cost of the health, livelihood and happiness of the denizens of Eloor.

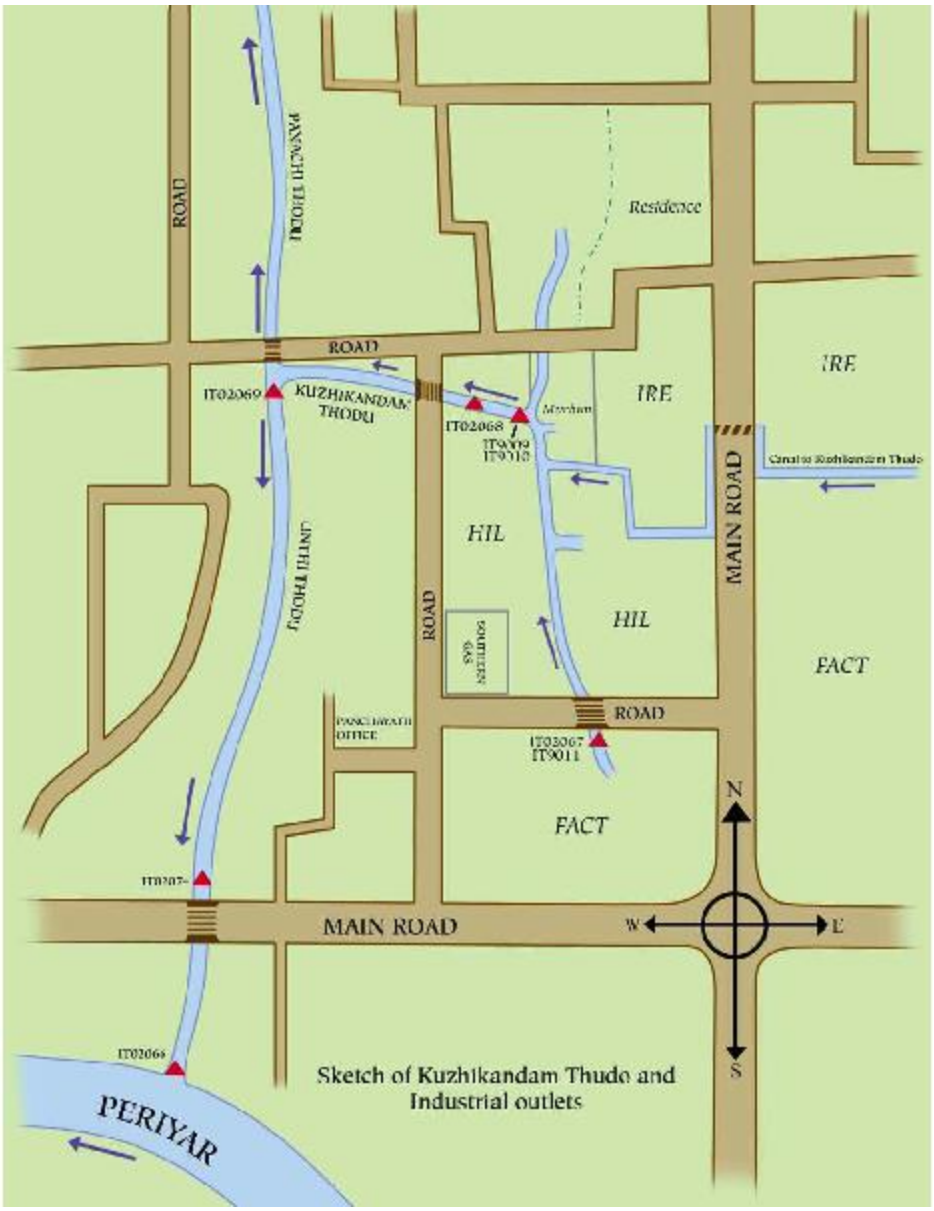
Objectives:

- To summarize and compile all the previously conducted studies at Eloor
- To compare the findings of the various reports and look for trends and changes over the years
- To take a second look at the studies and the findings and draw new correlations and conclusions from them

Map of Eloor Panchayat: The numbers represent the location of the wards. The industries are mainly located around wards 4, 19 and 20.



This map is a sketch of the industrial complex in relation to the Kuzhikannom Creek (a tributary of the Periyar). Ward numbers 19 and 20 of the Eloor Panchayat are adjacent to the Creek:



Greenpeace Report - 1999

Greenpeace conducted this study to identify any toxic chemicals in the effluents that was being discharged from the Hindustan Insecticides Ltd (HIL) plant to the Kuzhikkandom creek. Greenpeace international visited the Udyogamandal Estate on

22nd May 1999 and collected samples of water and sediment from the creek and of soil/sediment from the adjacent wetlands, for analysis of organic contaminants and heavy metals.

A total of six samples were collected in the vicinity of the HIL site on 22nd May 1999, including one sample of water/effluent from the creek, two sediment sample from the same creek (one upstream from HIL and another downstream) and three samples of soil /sediment from the surrounding wetland area. All soil samples were collected at a depth of approximately 20-30 cm.

All samples were collected and stored in pre-cleaned glass bottles (rinsed thoroughly with nitric acid and analytical grade pentane in order to remove all heavy metal and organic residues). Soil/sediment samples were collected in 100ml bottles. The single aqueous sample was collected in a 1 liter bottle, ensuring that no air bubbles were present. All samples were immediately sealed and cooled upon collection, and returned to the Greenpeace Research Laboratories for analysis.

The results of the analysis were:

Sediment from the creek sampled 10m downstream from HIL contained more than 100 organic compounds, 39 of which were organochlorides, including DDT and its metabolites, endosulfan and several isomers of hexachlorocyclohexane (HCH).

Sediment collected immediately downstream from the HIL and Merchem plants, showed very heavy contamination with a wide variety of organic compounds, including a predominance of chloride chemicals. Among the organochlorides identified

in this sample were two isomers of DDT, several DDT metabolites, four isomers of HCH, including the gamma isomer lindane, two isomers of endosulfan and its metabolite endosulfan ether.

The samples collected from the wetland area contained the wide range of organochlorine compounds. DDT and metabolites, dichlorinated benzophenone and cyclohexadecane, aliphatic hydrocarbon were also found. The sediment collected from Kuzhikkandom creek downstream from the HIL plant identified a similar range of DDT metabolites and chlorinated benzophenones.

Analysis of nine metals was undertaken for all the samples in this study. Sample sediment collected upstream from the HIL site, contained the highest levels of heavy metals. The samples contained concentrations of cadmium, chromium, copper, mercury, and zinc.

The results gives a strong indication that the HIL have resulted the significant contamination of the Kuzhikkandom creek with DDT, endosulfan, HCH (BHC) and a wide range of other hazardous organochlorine and are resulting in the ongoing release of many of these chemicals to the environment. DDT and other organochlorides were also detected in the wetlands surrounding the plants **(see page no. 8 and 9).**

This was one of the first significant scientific studies conducted at Eloor and it successfully brought to the notice of the Government and the public the high chemical contamination of the water and soil in Eloor produced by HIL.

Greenpeace Follow up Study-2003

In 2002, another study was conducted by Greenpeace to look for any improvement in the environmental situation and to investigate the levels of pollution through the Kuzhikkandom creek of the Periyar River. The study was conducted as follow up to the 1999 Greenpeace study. It focused on throwing light on the high levels of contamination in water bodies at Eloor.

A total of six samples were collected in the vicinity of the HIL site on 12th November 2002, including one sample of water/effluent from the creek upstream of HIL and five sediment samples from creeks downstream of HIL. The samples collected were sediments from Unthi creek, Panachi creek and Kuzhikkandom creek and effluent from effluent channel leaving the Fertilizers and chemicals, Travancore (FACT) plant, upstream of HIL. All samples were collected and stored in 100ml glass bottles. The sample selection was done with the cooperation of the Periyar Anti pollution Group (PMVS). Samples were analyzed at the Greenpeace Research Laboratories at the University of Exeter, UK.

Analysis of samples by gas chromatography/mass spectrometry identified organochlorine and hydrocarbon compounds in all of the sediments. Sediments contained between 20 and 30 identifiable organochlorines as well as numerous hydrocarbons. A gradient of organochlorine pollution was seen from the plant to the south of the island, where the contamination enters the river Periyar. Also heavy metals like zinc, mercury, cadmium, copper, lead and chromium were identified in the

sediment samples. The study focused more on the samples near the factories such as HIL, Indian Rare Earth (IRE), FACT, Merchem, Binani zinc and TCC.

Sample collected from Kuzhikkandom creek immediately downstream to the HIL territory, contained a wide range of organic contaminants, including isomers of DDT, DDT metabolites, and isomers of HCH.

Analysis of the water and sediment samples collected around the HIL plant reconfirmed the contamination of Kuzhikkandom creek with a wide variety of hazardous chemicals including DDT, HCH and heavy metals, which were previously seen in the Greenpeace study in 1999.

Comparison between levels of organic chemicals from the 1999 and 2003 study

Groups of chlorinated compounds	Sediment(2002 study)	Sediment(1999 study)	Effluent(1999 study)
DDT and its metabolites	14	11	7
Chlorinated benzenes	4(7)	8	5
Chlorinated alkylbenzenes	3	3	n/d
Hexachloro cyclohexanes	4	4	2
Pentachlorocyclohexenes	n/d	1	n/d
Chlorinated cyclopentenes	n/d	n/d	1
Hexachlorobutadiene	1	1	1
PCBs	4	1	n/d

Comparison between the levels of heavy metals in samples which were collected at the same location of the riverbed in 1999 and 2003

Name of heavy metals	Sediment(1999 study) Mg/kg	Sediment(2002 study) Mg/kg
Cd	n/d	<1
Cr	57.6	103
Co	5.7	5
Cu	22.6	52
Pb	30.2	79
Mn	142.5	97
Hg	0.7	0.8
Ni	6.6	19
Zn	67.7	215

Hence the follow up study also revealed that the water bodies of Eloor were highly contaminated by the toxic wastes from the industrial plants surrounding it. The levels of the chemicals in the river had **increased** between 1999 and 2003.

Status of human health- a Greenpeace study

After basic epidemiological training at the CHESS (Community health and environment skillshare) Workshops - I and II, Greenpeace decided to coordinate a health survey at Eloor on September 2003.

Greenpeace initiated the survey with the alliance with Occupational Health and Safety Cell, Mumbai, which has prior experience in epidemiological research. The ethical guidelines developed by the National Committee for Ethics in Social Science Research in Health.

The Greenpeace team started field based work on health assessment in April 2003 and continued the field investigation till July 2003. The first step was to obtain consent to do the assessment and to ensure participation and cooperation from the local Panchayat and local community. The second step was to collect all needed information from the community.

Training of the interviewers, community sampling exercise, and pilot surveys to identify the practical difficulties in the field were also performed. The universe of the study was 9122 individuals from both Eloor and Pindimana. And the data collection was done by 10 trained interviewers and the duration was 45 days.

The analysis of the collected data was done using MS Office software coupled with manual computation techniques to reach the figures on prevalence percentages, incidence, and statistical significance.

The survey findings revealed that all types of diseases were prevalent at much higher levels at Eloor as compared to Pindimana. The lung function tests conducted in

Eloor among those complaining about breathing problems also showed a very high prevalence of respiratory illnesses. These findings show that the cocktail of poisons in the air and water of Eloor is exerting synergistic effects to cause poor health and well being of the local population. The mortality due to **pollution-related illness** like cancer **(2.5 times)**, birth defects **(2.63 times)**, asthma **(2.23 times)** and bronchitis **(3.35 times)** is very high in Eloor as compared to the control population. They attribute this to the presence of polluting industries as it is the main factor that differentiates Eloor from the control population at Pindimana.

Environmental Audit Report – 2005

This was a report commissioned by the Supreme Court Monitoring Committee (SCMC) and was conducted by an empowered group called the Local Area Environment Committee (LAEC).

The SCMC commissioned this study after seeing the dismal state of affairs at Eloor and Periyar due to the widespread disregard for pollution control standards and laws.

The committee consisted of representatives from the judicial system, State Government and civil society.

The committee reviewed the situation in Eloor over a period of almost 2 years and submitted a huge report to the SCMC.

Each factory was reviewed separately, giving details of the raw materials used,

production process, waste composition and waste treatment facilities. They mention the steps each factory has to take to ensure proper control of pollution. Not a single factory was adhering to the existing regulations.

The report exposes the blatant violations by each industry and the ineffectiveness and the inertia of the Pollution Control Board.

The factories were given time to implement the recommendations of the committee. Most of them however have not implemented them.

There are many shocking photographs printed in the reports showing the obnoxious conditions inside and outside the factories, the colours of the river due to the pollutants and violation of laws.

It is however unfortunate that due to corruption, two separate and opposing reports were submitted by the SCMC to the Supreme Court which eventually led to the dissolution of the committee.

STATUS REPORT ON PERIYAR RIVER - 2004

Dr. M. L. Joseph et al made an attempt to review the available literature on Periyar river ecology. The study is a journey through the geography and history of Periyar, the demands on Periyar, navigation, fisheries, industries, deforestation in the Periyar valley, tourism, sand mining, pollution (mainly industrial) and the pollution status assessment.

For the pollution status assessment, they have made an attempt to review the different studies which reveal the facts about the various aspects of pollution of the

Periyar. This includes the presence of radioactive elements, heavy metals, nutrients, nitrate, phosphate, ammonia, nitrite, sulphate, the biological oxygen demand (B O D), chemical oxygen demand (C O D) and so on (see next page).

The study reveals a significant lack of scientific information on various ecological parameters of the river with reference to its alarming proportion of contamination from sources like small and large industries, agricultural run-off and sewage cum garbage pollution from cities, towns and other local bodies.

On the biodiversity aspect, they have found a change in the algal species in various parts of the river which indicate a change in the chemical composition. The number of fish species and also the number has decreased drastically around the Eloor industrial area.

The study concludes by saying that further investigation should be conducted on unexposed but vital components of the river system which includes significant areas like rapidly disappearing biodiversity, sand mining and its effects on river ecology, dangerous level of industrial pollution and its multidimensional impacts on river system and local inhabited area, large scale destruction of fishery resources and its socio-economic impacts on society.

Pollution indicators in lower reaches of Periyar River

Polluting agent	Source	Range	Place
	KSPCB, 1981	4600kg/day	Industrial area

B O D	NEERI, 1992	0.2mg/l	Eloor
	Greenpeace , 2003	2-6 mg/l	Edamalayar
Ammonia	Joseph et al, 1984	Trace-288µg/l	Alupuram to Eloor
	Joy, 1989	0.0-65.71µg/l	Edamalayar-backwaters
Nitrate	Paul & Pillai, 1974	5.5-8.57 ppm	Industrial zone
	Joseph et al, 1984	1.85-7.07µg/l	Industrial zone
	Joy, 1989	Highest-406µg/l	Industrial area
	Greenpeace, 2003	1-100.5mg/l	Industrial zone
Inorganic phosphate	Paul & Pillai, 1974	160-910µg/l	Industrial zone
	KSPCB, 1981	9500kg/day	
	Joseph et al, 1984	Trace-148.14µg/l	
	Joy, 1989	0-64.58µg/l	Edamalayar to backwaters
	NEERI, 1992	0.5-0.7ppm	Alwaye to Eloor ferry
	Greenpeace, 2003	1-2.5ppm	Industrial zone

The Egg Report : 2005

This study was conducted by IPEN (International Persistent Organic Pollutants Elimination Network) to analyze the level of POPs like dioxins from biological samples from various parts of the world, especially from industrial toxic hot-spots. Dioxins are among the most toxic chemicals in the world. The levels of this chemical in Eloor are sky high.

Table showing the levels of Dioxins in Egg samples from various samples from all over the world:

Annex 3: Levels of dioxins (PCDD/Fs) in different pool samples from different parts of world

Country/locality	Year	Group	Number of eggs/measured samples	Measured level in pg/g (WHO-TEQ) of fat	Source of information
UK, Newcastle (background level)	2000	free range	3/1 pool	0,20	Pless-Mulloli, T. et al. 2001
Germany, Lower Saxony	1998	free range	60/6 pools	1,28	SCOOP Task 2000
UK, Newcastle (lowest level from pool samples)	2000	free range	3/1 pool	1,50	Pless-Mulloli, T. et al. 2001
Uruguay, Minas	2005	free range	8/1 pool	2,18	Axys Varilab 2005
Czech Republic, Liberec II	2005	free range	3/1 pool	2,63	Axys Varilab 2005
Czech Republic, Usti nad Labem	2005	free range	6/1 pool	2,90	Axys Varilab 2005
Tanzania, Vikuge	2005	free range	6/1 pool	3,03	Axys Varilab 2005
Germany, Bavaria	1992	free range	370/37 pools	3,20	SCOOP Task 2000
Turkey, Izmit	2005	free range	6/1 pool	3,37	Axys Varilab 2005
Czech Republic, Klatovy	2003	free range	12	3,40	Beranek, M. et al. 2003
Belarus, Bolshoi Trostenec	2005	free range	6/1 pool	3,91	Axys Varilab 2005
Czech Republic, Lysa nad Labem	2004	free range	4/1 pool	6,80	Petrlik, J. 2005
Germany, Rheinfelden (lowest level from pool samples)	1996	free range	-	10,60	Malisch, R. et al. 1996
Slovakia, Kokshov-Baksha and Valaliky	2005	free range	6/1 pool	11,52	Axys Varilab 2005
Russia, Gorbatovka	2005	free range	4/1 pool	12,68	Axys Varilab 2005
India, Eloor	2005	free range	6/1 pool	13,91	Axys Varilab 2005
Germany, Rheinfelden (highest level from pool samples)	1996	free range	-	14,90	Malisch, R. et al. 1996
India, Lucknow	2005	free range	4/1 pool	19,80	Axys Varilab 2005
Mexico, Coatzacoalcos	2005	free range	6/1 pool	21,63	Axys Varilab 2005
Kenya, Dandora	2004	free range	6/1 pool	22,92	Axys Varilab 2005
UK, Newcastle (highest level from pool samples)	2000	free range	3/1 pool	31,00	Pless-Mulloli, T. et al. 2001
Senegal, Mbeubeuss	2005	free range	6/1 pool	35,10	Axys Varilab 2005
Russia, Igumnovo	2005	free range	4/1 pool	44,69	Axys Varilab 2005
Bulgaria, Kovachevo	2005	free range	6/1 pool	64,54	Axys Varilab 2005
Egypt, Helwan	2005	free range	6/1 pool	125,78	Axys Varilab 2005

Health survey report – Thanal, 2005

PMVS and Thanal together conducted a health survey for members of 300 households residing near the Kuzhikkandom creek at Eloor in April, 2005. The objective of the study was to assess the overall condition of the health of the people and to find solutions to some of the serious problems faced by the local population.

The Methodology used for the survey was a structured questionnaire prepared in the local language, Malayalam and the information was collected by educated, trained local community members through interviews of one member of each family. The survey was carried out among 326 families who reside on the banks of the

Kuzhikkandom Creek in the Eloor Panchayat. The families covered in the survey were residing in the area between 2 months and 60 years.

The major findings of the survey were:

The people residing near Kuzhikkandom creek were dependent on Public pipes, the Kuzhikkandom creek and wells as their main sources of water. But the situation was that the well water and the Kuzhikkandom creek were not suitable for use at all. It was found that well water and the creek water appeared colored at time - yellow, red, blue or black. When asked about the atmosphere there, the people reported that the air in their area "changes each day". Even if the air appeared to be clear, the odour of rotten eggs, human excreta, urine, ammonia, DDT and clay were commonly present. Most people also reported episodes of bad smells occurring at random times during the night.

The major health problems identified by the survey were respiratory diseases, cancer, reproductive problems, cardiac/heart diseases, neurological problems and muscular/skeletal problems. But asthma, heart attacks and cancer were seen to be the major cause of deaths in the surveyed area. The survey revealed that at present there were 6 individuals suffering from cancer, 4 of whom were women. Their diagnosis include: cancer of the spinal chord, stomach, uterus and breast, respectively. Reproductive health problems were another major issue in the area. Minor ailments like stomach ache and back pain were also very common. A table showing the statistics of the major diseases noted in the survey can be seen on **page no. 12.** The study thus

highlighted the major health problems in the community, and the only reason appeared to be the toxic wastes in the environment of Eloor.

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Eloor Health Survey 2008

The Kerala State Government commissioned a health survey at Eloor to understand the impact of industrial pollution on the health of the people residing in Eloor grama Panchayat.

The module of the health survey was prepared, discussed and approved by the committee which included Dr. Indira Murali, Dr. Krishna, Fr. M. K. Joseph, Mr. Purushan Eloor and Mr. Vijayakumar. The survey was coordinated by Dr. Celine Sunny, Chief Coordinator, Research Institute, Rajagiri College of Social Sciences.

The interview schedule was administered to 3246 households in 9 wards of Eloor grama Panchayat and to 360 households in 12 of the wards in the Pindimana grama Panchayat. A team of 30 surveyors was selected and they were given training for the data collection which included - a brief introduction about the health survey, familiarization of objectives and tools, mock interviews and a demonstration on the verification of data.

It was found that one third of the population was employed in each of the Panchayats. Most of the employed earned their living as coolie, construction workers, and daily wage workers formed the major group in both Panchayat.

The findings:

Almost 80% of the respondents perceived that their health problems are caused due to the pollution.

An overwhelming 92.8% agreed that the atmosphere (air) in Eloor is polluted whereas in Pindimana a majority (98.6%) felt that the air was very clean. Around 80% of the people at Eloor suffer from minor acute problems like coughing, breathlessness, headache everyday when the waste gases are released from the factories early in the morning and late in the night.

A huge number in Eloor (41.3%) felt that their well water is polluted as compared to just a few (0.79%) at Pindimana.

The above numbers are themselves enough to show the poor state of the environment at Eloor, and there can never be good health in a place with such a polluted environment.

The major health problems and also the major causes of death reported in Eloor were respiratory diseases, cardiac diseases, cancer, reproductive problems, neurological problems and skeletal problems.

Unusual medical conditions like congenital deformities and mental retardation which are associated with antenatal exposure to toxic chemicals are also much higher in Eloor (between 7 – 10%) as compared to the control population (less than 1%).

Though the report shows clear evidence of the pollution-related health problems at Eloor, they unfortunately remain diplomatically inconclusive at the end of the report. But they do go on to mention that the health problems **are probably** due to the pollution.

We at Thanal have scrutinized the numbers from the tables in the report a bit further to check for any co-relations that may have been missed and thereby found some interesting results which were not mentioned in the original report:

Though it was mentioned that the percentage of people with ill health at Eloor and Pindimana were 61.6% and 56.7% respectively, the **disease burden** at Eloor is **more than twice** that of Pindimana. This can be calculated by adding the prevalence of each individual disease from the comparison table, and the totals we get are: 120% for Eloor and 58% for Pindimana. This is because the individuals at Eloor are actually suffering from two or more conditions at the same time while at Pindimana the individuals do not commonly suffer from multiple diseases.

As we have mentioned earlier, the **pollution related illnesses** like congenital deformities and mental retardation **are much higher** in Eloor which is a point that has not been highlighted in the original report. This is a very important point showing the difference in the environmental conditions of the two places of our interest. There are several chemicals in the environment of Eloor which are feto-toxic. Pregnant women are exposed to them through the air, water and the locally grown food.

If we observe the table showing the disease prevalence system-wise, we see that in Eloor each disease has a prevalence which is **at least twice** the number in Pindimana. Such a significant co-relation has also been missed from the original report.

Not enough importance has been given to the daily plight suffered by the people there, the release of waste gases cause breathlessness and cough for 80% of the people which affects their activities of daily living.

The report also mentions that the well water and river water in Eloor is coloured and has bad smell. This is a very significant point because water is the basic necessity for life and it is a complete violation for such contamination to occur.

To further prove statistical significance, Chi square tests were performed on various disease prevalence and these were some of the results:

Respiratory diseases

Sample	Affected	Unaffected	Total
Eloor	2048	7663	**9711**
Pindimana	131	1371	**1502**
Total	**2179**	**9034**	**11213**

Chi squared equals 126.299 with 1 degrees of freedom, The two-tailed P value is less than 0.0001. The association between rows (groups) and columns (outcomes) is considered to be **extremely statistically significant.**

Problems of reproductive system

Sample	Affected	Unaffected	Total
Eloor	229	9482	**9711**
Pindimana	17	1485	**1502**
Total	**246**	**10967**	**11213**

Chi squared equals 8.554 with 1 degrees of freedom, The two-tailed P value equals 0.0034. The association between rows (groups) and columns (outcomes) is considered to be **statistically very significant.**

Allergy

Sample	Affected	Unaffected	Total
Eloor	1344	8367	**9711**
Pindimana	68	1434	**1502**
Total	**1412**	**9801**	**11213**

Chi squared equals 101.650 with 1 degrees of freedom, The two-tailed P value is less than 0.0001. The association between rows (groups) and columns (outcomes) is considered to be **extremely statistically significant.**

Neurological problems

Sample	Affected	Unaffected	Total
Eloor	367	9344	**9711**
Pindimana	12	1490	**1502**
Total	**379**	**10834**	**11213**

Chi squared equals 34.472 with 1 degrees of freedom, The two-tailed P value is less than 0.0001. The association between rows (groups) and columns (outcomes) is considered to be **extremely statistically significant.**

Gastro intestinal diseases

Sample	Affected	Unaffected	Total
Eloor	307	9404	**9711**
Pindimana	17	1485	**1502**
Total	**324**	**10889**	**11213**

Chi squared equals 18.378 with 1 degrees of freedom, The two-tailed P value is less than 0.0001. The association between rows (groups) and columns (outcomes) is considered to be **extremely statistically significant.**

Musculo-skeletal problems

Sample	Affected	Unaffected	Total
Eloor	1896	7815	**9711**
Pindimana	155	1347	**1502**
Total	**2051**	**9162**	**11213**

Chi squared equals 73.128 with 1 degrees of freedom, The two-tailed P value is less than 0.0001. The association between rows (groups) and columns (outcomes) is considered to be **extremely statistically significant.**

A Comparison between the 2005 and 2008 health surveys

The table below represents the comparison between the health problems of people near the Kuzhikandam Creek (wards 19 and 20 of Eloor) in two surveys conducted 3 years apart. It shows a rapid increase in the disease profile of the people residing in the two wards near Kuzhikandam Creek over the 3 years.

Major Health problems	2005 study	2008 study
Diabetes	87 (2.39%)	163 (4.47%)
Cancer	6 (0.16%)	13 (0.35%)
Respiratory diseases	67 (1.84%)	646 (17.75%)
Allergy	615 (16.90%)	476 (13.08%)
Cardiac/heart problems	70 (1.92%)	370 (10.16%)
Reproductive problems	64 (1.75%)	109 (2.99%)
Muscular problems	60 (1.64%)	694 (19.09%)
Neurological problems	81 (2.22%)	160 (4.39%)
Birth defects	14 (0.38%)	15 (0.41%)

Thyroid gland problems	24 (0.65%)	74 (2.03%)

The data for the above 2 studies has been collected by two different groups using a slightly different sample population from the same study area. Hence this fact should be kept in mind while making the correlations.

There is a clear indication that the health of the people of Eloor has worsened drastically between the years 2005 and 2008. This is especially true for respiratory diseases which have shown an alarming **ten time increase** in number. This only goes to show that the standards and the recommendations the Monitoring Committee had recommended have not been implemented. The pollution continues as usual.

The next page contains a table comparing the health survey data of Eloor, with those of Pindimana, Kerala State surveys of 1997 and 2004. These numbers just go to show that the people at Eloor face a much higher risk of acquiring disease. The only factor that seems to cause this significant difference in health indicators is the presence of polluting industries in close proximity to the settlements. Kindly see the table on the next page.

Comparison between health status of Eloor with health statistics of Kerala state from various studies : (Numbers indicate prevalence of chronic diseases per 1000 population)

Diseases	Pindimana (2008)	Eloor (2008)	1997 KSSP study report	2004 CDS study report
Asthma	6.3	72.2	14.3	16.20
Cancer	0.2	3.4	2.3	2.38
Diabetes	5.6	71.2	5.5	16.90

Skeletal problems	15.5	189.6	18.3	-
Cardiac/heart diseases	14.6	109.6	5.98	10.81
Problems in reproductive system	1.7	22.9	4.14	-
Neurological problems	1.2	36.7	0.92	2.58
TB	0.1	0.4	4.1	2.96

To further look for any co-relation on the factor of proximity to the polluting factories to the prevalence of disease, we segregated the wards according to their locations with respect to the industries and the polluted part of the river. We found that wards – 4, 19 and 20 are the wards which are closest to the industries and the polluted part of the river and hence should be the ones facing the maximum brunt of the toxicants. These wards are labeled as **"high exposure"**. We then found that wards – 5, 6 and 8 are the ones lesser exposed as compared to other wards at Eloor and these have been labeled as **"moderate exposure"**. To demonstrate the above statements, we have printed a map of Eloor below showing the location of the industries, river, factories, wards and direction of water and wind. Finally, we used the control population at Pindimana as **"least**

exposure" since they are most distant from the industrial area. The table clearly shows that **there is a dose-dependent response of diseases** and wards 4, 19 and 20 are the ones having the maximum disease prevalence. This is a very clear indication that the poor health at Eloor is due to nothing else but the presence of the polluting industries and hence the poor state of the environment there.

Comparison between the disease occurrence between area depending on dose of exposure to the pollutants/ distance from factories:

Name of disease	High toxic exposure	Moderate exposure	Less exposure
Respiratory diseases	21.2%	16.3%	8.7%
Gastro intestinal problems	3.3%	1.5%	1.1%
Musculo skeletal problems	19.4%	15.8%	10.3%
Cardiac/heart diseases	11.4%	11.1%	9.7%
Cancer	0.4%	0.5%	0.13%
Neurological problems	4.8%	2.5%	1.1%
Problems in reproductive system	2.8%	1.6%	1.1%

Allergy	15%	12.5%	4.5%

Conclusion:

With so much evidence available on the presence of toxic chemical in alarming concentrations, along with the evidence of altered and reduced biodiversity in the Periyar and also the poor condition of health at Eloor, it is clear that the industries in Eloor and the Pollution Control Board of Kerala are responsible for the above. In the light of such a blatant act of human rights violation and right to a clean environment, it appears that the meaning of 'development' has been lost amidst the foreign exchange and thick smokes that emanate from the chimneys of the industries.

There is no doubt that the cause of ill-health at Eloor is due to the high level of toxic chemicals there. Immediate action should hence be taken to curb the pollution and restore the lives and livelihoods of the people of Eloor.

The Situation in Kasargod – 2008

Kasargod had been under the wrath of the poison called Endosulfan and for 30 years they suffered under its showers. Now it is almost 8 years that the spraying of the pesticide has been stopped but some of its legacy can be seen among the people of Kasargod.
Being an extremely hazardous chemical, it has caused various health problems like congenital anomalies, mental retardation, delayed puberty and cancer.
The spraying was stopped due to protests from the local people and also a lot of other support groups and the media.

Based on the temporal and spatial associations of the spraying and the residence of the communities, and the toxicological profile it was clear that Endosulphan is the most likely cause for most of the health problems listed above.At the end of the long struggle, the High Court banned the use of Endosulfan in Kerala purely on a precautionary principle. Knowing that the

half life of Endosulphan is between 28 and 500 days, one can say that the effects should decrease over a period of 8 years.

Alongside the ban on the use of endosulphan (the ban was in 2004,when was the cell set up ?) , a remediation cell has been setup for the compensation and relief for the victims of Endosulfan . This cell has been in operation for a period of one and a half years and has conducted many activities already. It is a government approved body consisting of members from Zilla Panchayat, members of Panchayat from the affected villages and the civil society.

During this visit I have interacted with many of the persons involved in the relief process and also with health professionals and patients. Each had varied perspectives regarding the remedial measures but the doctors were unanimous that the disease profile is returning to normal. This document is an account of my experience at Kasargod. Since there are many perspectives about the issues, the document is a collation of all perspectives. I have not presented my opinions in this document and will submit the same as soon as possible in a separate document.

I thank Dr. Sripati for his kind hospitality and guidance at Kasargod and the members of Thanal for the opportunity.

Objectives:

1) To learn about the functioning of the Endosulphan Cell and its activities

2) To meet health professionals in Kasargod and understand the health situation there.

3) To interact with patients and learn if and how the remediation measures have been helpful.

Visit duration:

5 day visit between the 15th and the 19th of October, 2008.

Persons met:

Dr. Sripati Kajampady, General Practitioner, Perla
Dr. Mohan Kumar, General Practitioner, Perla
Mr. Sree Padre, Journalist, Swarga
Mr. Lakshmipriya, Teacher, Sarva Siksha Abhyan (SSA)
Mr. T. Balakrishna, VP, Enmakaje panchayat
Mr. Madhavan Nambiar, Coordinator, Endosulphan cell, Kasargod
Dr. Ravishankar, PHC officer, Vaninagar

Dr. Krishna Kumar, PHC officer, Perla
Ms. Leelakumari, retd. Govt agricultural officer
Several victims of the spraying

The Endosulphan Cell

The Cell is one and a half years old and is located in Kasargod in the Zilla Panchayat building. It comprises of 34 members – 10 members from Zilla Panchayat, 11 members from the Panchayats of the affected villages and 13 members from civil society.

The Cell is a government approved body and will not be affected by change in governance. The functioning of the Cell is not time bound. Meetings have been held almost every 2 or 3 months to discuss the issues related to the remediation measures and future activities. The main activities so far have been:

- Conducting health surveys and medical camps to create victim lists at each panchayat level with the help of the associated PHCs. Following the surveys, 103 patients were sent for further management to KMC, Mangalore. Of these, 63 received treatment there and the rest needed rehabilitative measures. The survey had revealed a high rate of physical disability and these patients have received aids such as wheel chairs, hearing aids and spectacles. A total of approximately 250 such aids have been distributed, which was completed last month.

- Compensation of Rs. 50,000 has been for the families of the deceased and seriously ill patients. In the first phase 123 families were given the amount, now in the second phase another 45 families will be receiving the same..

- The recent budget has not allocated any extra amount for the Cell but the functioning continues as the previously given funds are not exhausted yet. They also plan to raise more money through the new website that's coming up. The Cell will then through the meetings decide on how the funds are to be used. The initial amount that was allocated for the remediation measures was Rs. 50 Lakh, of which Rs. 37 Lakh were for compensation, Rs. 6 Lakh for research work and Rs. 7 Lakh for aids like wheel chairs and spectacles.

If any victim has been left out of the survey, an application letter can be written to the Cell informing the same. The Cell then instructs the local PHC to confirm that the person is indeed suffering as a consequence of the spraying. The PHC officer then informs the Cell about his/her findings. The coordinator of the Cell is still receiving such letters from patients.

There was a vision at the start of the Cell's operations for initiating community based rehabilitation, special schools, pensions etc but these things have not taken shape yet because of the geographic profile of the affected areas.

The Health Situation in Kasargod

As I've mentioned earlier, the spraying had caused an increase in a number of unusual diseases like congenital anomalies, delayed puberty, mental retardation, abortions and cancer. Dr. Mohan Kumar had documented his observations about these illnesses and was one of the first person to bring this to media attention. The people of Kasargod were exposed to Endosulphan directly by the spraying and also by the contaminated water, food and air.

Dr. Mohan Kumar and Dr. Sripati are the only doctors who have been practicing in Kasargod through the entire fiasco and hence have a better picture of the trends. The medical officers at the PHCs are here since one year only and give a good account of the current disease trends. The medical records at the PHCs also give valuable information about the trends.

Most of the unusual diseases mentioned above have not been seen by any of the doctors recently. All the patients of these conditions are old ones (those who got the disease more than 5 years ago). Amongst the children who were born the last few years there has been no case of congenital anomalies or delayed development. One doctor has noticed a high stillbirth rate among Muslim women in Perla but attributes it to the high birth order among them. The number of abortions has also dwindled to very few. A majority of the doctors confirmed that the rate of cancer has decreased but one doctor says that it continues to be the same. Hormonal problems like delayed puberty, abortions, menstrual abnormalities have all decreased. The doctors go on to mention that the disease profile has returned to normal except for conditions like chikungunya, scabies and hypertension which are higher than normal.

I checked PHC registers at the Vaninagar PHC and found that that what the doctors were saying was true. Patient records have been maintained for separate diseases (since when ?) and there has been no new entry in the records for seizures, mental retardation, disability and cancer. The number of new entries for gynecological problems too has decreased. The cancer patients who were registered have all died. The pharmacist still has some left over stock of the cancer chemotherapy which was meant for those patients. No cases have been registered of late.

The various comments on the remedial measures

I interacted with 10 patients at each of their homes. I got their contacts of these patients from the list of affected victims at the Zilla Panchayat and Perla PHC; and chose all the patients from the Enmakaje Panchayat who received surgical or medical care. I also spoke to the doctors and the Govt employees about their opinion on the remedial measures.

While speaking to patients it comes to notice that most of them are receiving some remedial measures but they are not sure who the provider is. The schemes are being conducted by the following agencies: the State Government of Kerala, Solidarity (an organization working for social causes), SSA (expand here as it appears first here) and the community itself. Most of the measures have been coordinated through the Cell.

The medical camps that were conducted initially certainly helped in covering the affected population to screen for victims; but the camps did not help the people medically. Many of them were referred to higher centres and didn't have the means to do so.

The medicines for the patients are also being provided for most cases in the closest PHC. Medicines for seizure and the other psychiatric conditions have been made available at these PHCs and have helped in symptomatic relief for the patients. Surgical care has been provided for all the patients who required it; the major surgeries have been conducted at KMC (expand) Mangalore. The patients I interviewed underwent some major surgeries and are doing much better after the surgery. The Cell has borne the costs of the surgery and hospital stay. These interventions have definitely improved the quality of life of the patients and the families.

The patients who are affected with serious disability, surgical disorders or chronic medical disorders are getting a monthly pension of Rs. 140 – 200. This is to support the member who stays back at home to look after the sick relative. This has been in operation since 2 years according to the affected families and they are happy about the fact that some monthly pension is being provided. Most of them feel that the amount is adequate.

Some of them have to follow up at KMC and have to buy medications from outside. This is proving quite expensive for them. Some patients have also been advised scans and are not sure if the Cell can provide them monetary support for that. The remediation for one patient has been halted for reasons he does not know.

An organization called Solidarity is providing food and provisions for affected persons on a monthly basis which the families have found very helpful. This scheme has been in operation for more than 2 years now. The group has also promised to build houses for some of the families who lack decent housing facilities.

The SSA has initiated a pilot project in Kasargod in an effort to mainstream 108 physically and mentally challenged children. This is to be conducted through weekly meetings, parent training and medical and rehabilitation measures. The children have been assessed for the level of disability and are being provided with whatever aids that have been prescribed for them. They are being taught exercises and are given opportunities for social interaction; and the children with less minor mental disability will be given formal education.

In certain cases, the members of the community have themselves contributed for the relief of certain victims.

Some of the persons I interviewed felt that not all the people who received compensation are victims of endosulphan. Many of them are coming forward for the Rs. 50,000 and hence the meaning is lost. But the doctors do say that it is difficult to differentiate patients who were affected from those who were not, as the diseases could present in similar ways. There may have been political contamination in preparing some of these victim lists. Some also feel that the funds are not being used appropriately; they want the seriously ill victims to get a monthly pension of Rs. 1000 – 1500 which would prove useful for the families. Some are of the opinion that the Cell

only conducts meetings without any meaning or action; and the functioning is very political and not for social benefit.

As such it appears that the initial surveys have picked up most of the affected persons and families. The affected families are aware of the measures but do not have good knowledge about it. At times they are confused about what to do in cases of referrals. The surgical and medical interventions have proved very helpful for the affected families. The pension plans are inadequate to meet some needs. The SSA has definitely come to the aid of disabled children; this was one missing link in the remedial measures so far.

My impression and comments on the Kasargod relief and remediation efforts

It was truly heartening to see that such an effort has materialized considering the state of affairs in most other affected places in the country. As Dr. Sripati has said, it seems to be more due to providence than anything else. The ban has now lasted for almost 6 years and the health and environmental parameters seem to be improving. Declaring Kasargod as an organic district is a great preventive measure that has been taken.
During my visit, I had a chance to understand the objectives and the functioning of the Endosulphan cell, the efforts conducted so far and also about the support from external agencies for the relief of the people of Kasargod. Some however expressed their concerns and opinions on the functioning of the cell and the remediation efforts. Here I have presented my understanding of the remediation efforts.

There is no doubt that even though the spraying has been stopped, the affected victims will suffer for the rest of their lives and hence will require continued support. The Government has not allocated any money from this year's budgets for the Endosulphan Cell; therefore the future activities **may depend** totally on donations from external sources. For this reason, the campaign through the website and other methods will have to be strong. The Sarva Shiksha Abhyan (SSA) and an organization called Solidarity (NGO) are also conducting relief measures in Kasargod.

There should be meetings conducted where representatives from Solidarity and SSA meet with the Endosulphan Cell members so that the activities can be discussed and coordinated. The coordination of activities will save time, effort and money and will prove beneficial in the long run. It will prevent overlap of services and also encourage optimal utilization of resources. The discussions should be open and no group should be forced to anything against their will. Such an event will only hamper the remediation measures.

The families are already receiving a pension of Rs. 140 – 200 per month. This amount can be increased, **especially** for those families who have patients with physical or mental disability, death of earning members and chronic serious conditions; thereby are required to stay at home all the time.

I feel that **no further** planned medical surveillance or survey is necessary. Also there is provision for potentially affected individuals to write to the Cell to inform about their condition. This is an important link for the patients to file in their complaints and hence it should be kept

intact. The copy of such a letter can also be forwarded to a Cell member of civil society like Thanal or Mr. Shreepadre just for record keeping and counterchecking.

The medical officers in the PHCs of the affected panchayats and also the local GPs **could be further sensitized** about the issue and be told to contact the Cell if such cases are seen. I am not sure of what the relation is between the age group of the affected patients with the time of stopping the spraying. A calculated guess will be that the potential cases would have been born before 2003, as the spraying has been stopped since 2002. This is considering the fact that no new cases of MR and congenital malformations have been seen in the last 5 years.

Most of the affected patients are receiving their special medications free of cost from the PHCs and the patients who were to get surgical interventions have received it from KMC Mangalore and other hospitals nearby. Patients with need for appliances to assist their handicap have also been provided the same through the Endosulphan cell and the SSA.
So the **main area of concern** is the rehabilitation work for the affected families

The **Sarva Shiksha Abhyan** has already started an effort to mainstream the disabled children; and to give community based rehabilitation for them. Periodic checkups by doctors and physiotherapists will also be done. The project has just been started two months ago and the funding for this is from the state and central government. One of the initial visions of the Endosulphan Cell was to start community based rehabilitation measures; and hence this matter can **be discussed with the teachers in this project of the SSA –** Mr. Lakshmpriya is the one in-charge in the Vaninagar area. Furthermore, details of community based rehabilitation can be obtained from groups like CBR Forum and APD (Association for people with disability) in Bangalore.

Facilities for **vocational training** for such children and adults can also be discussed with the SSA teachers so that they can contribute to the income of the family. This can be discussed with the SSA and the CBRF and APD groups from Bangalore

The organization called **Solidarity** is already providing provisions on a monthly basis for the victims; and their activity **can also be discussed** at the Cell meetings as an adjunct. This is important to ensure that the remediation activities don't overlap. The organization is also planning for some medical rehabilitation according to some of the affected families.

Coming to the referral services, certain patients who are going for **follow- ups** at the KMC Mangalore have to bear the expenses of the travel, stay, investigations and the medications. Such patients who have been registered as Endosulphan victims could be entitled for **additional allowances** if the funds allow it.

The above measures are the ones I felt could be performed. Considering the terrain and the distribution of the houses in Kasargod, any relief measure will be difficult. I therefore applaud the efforts that have gone in so far for the victims and I hope for their continued success.

Chemicals in the Periyar – Analysis and interpretation

Thanal, Trivandrum, India
Dr. Romeo Quijano, Professor, University of the Philippines Manila, and President of PAN Philippines
Dr. Adithya P, Community Health Cell, Bangalore, India

Background:

We received data from the Pollution Control Board (PCB) of Kerala on the levels of various chemicals that were being "monitored" in the Periyar. This River is called the Lifeline of Kerala, but has been receiving effluents from the Eloor indusrial complex since 1946. There are many people living around this area and had been using the river for livelihood and nutrition before 1946. Due to the unregulated high level of pollution there, the people and fauna have faced severe problems. The number of fish has become very low and also the bird population has decreased. The people face a variety of pollution related illnesses. Due to sustained public pressure, the PCB has been monitoring the river for the levels of various problem chemicals since 2004.
However, we feel that their methodology and rationale for the sampling; and timing of sample collection are very unclear and disorganized; details for which will be available in this document. We have tried to get the maximum out of the data available to us.

The data available:

The data given to us was in the form of date-wise tabular columns containing values of the chemicals that have been tested and the location of the sampling. We have not received any information on the methodologies followed by the Pollution Control Board.
From them, we came to the conclusion that there are 6 problem chemicals at Eloor which are:

Benzene hexa-chloride (BHC)

Endosulphan

Dichloro diphenyl trichloroethane (DDT)

Cadmium

Lead

Mercury

The tests have been conducted between 20.11.2004 and 7.8.2008 for the above mentioned chemicals. Various locations on the Periyar within Eloor have been tested during this timeframe.

The problems with the sampling methodology of the PCB:

For a visual proof of the problems of the sampling methodology, the datasheets may be viewed.

The total number of samples that have been collected over the 4 year period and the number of locations from which they have been tested:

Chemical	Number of samples tested	Number of locations tested
BHC	105	54
DDT	68	27
Endosulphan	92	49
Cadmium	112	108
Lead	113	106
Mercury	20	20

From the above table, we can see that the samples have not been tested repeatedly from the same location but from a new location each time which leaves little room for temporal comparisons. It is hence very difficult to comment on any *improvement* or *deterioration* in the pollution status over the years. If all the sampling were done from one or a few sites repeatedly then some conclusions could have been drawn from them.

Secondly, the timing of the sampling is very irregular. This too can be confirmed from the data spreadsheets available. Many samples have been collected but there is no consistency in the timing. If the samples had been collected on a particular date of every month over the 5 years, it would have proven far more valuable and would have served as a monitoring tool.

Therefore, the best way to use the available information, which of course is in the form of scattered data, will be to assess each data point individually. This itself has been helpful enough to prove a point.

Each chemical has been assessed separately using various accepted standards from India, other countries and from respectable organizations like the WHO.

Each chemical has been compared with standards for effluent water, river water, river sediment, drinking water, accepted levels for freshwater life. List of references:

CPCB – Central Pollution Control Board of India
http://www.cpcb.nic.in/Industry-Specific-Standards/Effluent/PesticideIndustry.pdf

EPA – Environment Protection Agency, USA
http://www.epa.gov/ogwdw/contaminants/index.html#1

Levels for aquatic life – SEPA, National Centre for Environmental Toxicology, Scotland
ATSDR - Agency for Toxic Substances and Disease Registry
http://www.atsdr.cdc.gov/toxprofiles

EU Standards – http://balwois.com/balwois/administration/full_paper/ffp-541.pdf

Mg – milligram
Mcg – microgram
Ng - nanogram
L - litre
Ppb – parts per billion

Diseases associated with high concentrations of heavy metals:

Disease	Chemical	Concentration
Minamata	Methyl mercury	1 to 10 mcg/l
Shortened life	Lead	50 mcg/l
Itai-itai	Cadmium	1 to 10 mcg/l

(From 'Water Pollution', S K Aggarwal)

Drinking water standards:

Metal	WHO (highest desirable)	WHO (maximum permissible)	Ministry of Works and Housing 1975 (Acceptable)	Ministry of Works and Housing 1975 (Cause of rejection)
Lead	-	0.1	0.1	0.1
Cadmium	-	0.01	0.01	0.01
Mercury	-	0.001	0.001	0.001

(From 'Water Pollution', S K Aggarwal)

CPCB standards for effluents, 1995:

Parameter	Inland surface water	Land for irrigation	Marine coastal

			water
Mercury Max. (mg/l)	0.01	-	0.01
Lead Max. (mg/l)	0.01	-	1.0
Cadmium Max (mg/l)	2.0	-	2.0

(From 'Water Pollution', S K Aggarwal)

Endosulphan

Health effects associated with endosuphan: damage to kidney, developing foetus, and liver. Immuno-suppression, decrease in the quality of semen, increase in testicular and prostate cancer, increase in defects in male sex organs, and increased incidence of breast cancer. It is also carcinogen.

A growing body of evidence suggests that endosulphan has estrogenic activity and can disrupt hormonally mediated processes. The U.S. EPA considers it to be a potential human endocrine disruptor, and in 2000 Agency for Toxics and Disease Registry (ATSDR) concluded that "endosulfan may potentially cause reproductive toxicity in humans." Since then, studies of populations exposed to endosulphan have been published suggesting that endosulphan can increase the risk of autism, delay puberty in boys, and cause birth defects of the male reproductive system.

Accepted standards:

CPCB effluent standard (max): 100 mcg/l

EPA value for rivers (max): 74 ppb

Accepted levels for freshwater organisms (max): 0.003 mcg/l or 3 ppb

The analysis:

A total of 49 locations have been tested between 12/3/2005 and 23/6/2008. Most of the locations have been tested only once hence trends will be difficult to study (see page 12 for a comparison graph). The total number of values are 92.

None of the values are higher than that prescribed for the effluent levels by the CPCB.
All the values recorded are ***much higher*** than the accepted levels according to the EPA. All the values are also ***much higher*** than those recommended for freshwater life forms.

The highest values were: (alphabet represents the column in the respective excel sheet)

B: 62.4 mcg/l
D: 30.9 mcg/l
H: 25 mcg/l
P: 23 mcg/l
AA: 64.61 mcg/l
AC: 31 mcg/l
AM: 27.89 mcg/l
AN: 47.75 mcg/l
AP: 64.5 mcg/l

One *spot* alpha-endosulphan value was **147 mcg/l.**

DDT

Common health effects associated with DDT: reproductive effects: pre term births, decreased lactation period, early pregnancy loss, decreased psychomotor development, affects neuro-behavioral function, liver cancer, chronic liver damage, cirrhosis and chronic hepatitis, endocrine and reproductive disorders, immunosuppression, cytogenic effects, breast cancer, Non Hodgkins lymphoma, polyneuritis. (www.atsdr.cdc.gov)

Accepted Standards:

CPCB effluent standard : 10 mcg/l

EPA drinking water standard: 40 ppb

Accepted level for freshwater organisms: 0.025 mcg/l or 25 ppb

Mean concentration (ng/l) of pesticides in river basins (*Water Pollution* – S K Aggarwal)

	USA (ng/l)	UK (ng/l)
DDT	8.2 to 10.3	1.6 to 64.6
Lindane	2.8 to 28	18.7 to 38.6

DDT levels in Jamuna river: Mittal et al 1976 – 1978: (*Water Pollution* – S K Aggarwal)

Site	DDT residue in river water (**in ppb**)	DDT in bottom sediments (**in ppm**)
Wazirabad upstream	0.249	0.108
Wairabad downstream	0.558	0.254
Okhla upstream	0.36	0.205
Okhla downstream	0.294	0.353

The analysis:

The tests were conducted in 27 locations in Eloor between 12/3/2005 and 16/2/2008. The total number of values are 68. Only one test was done in most of the locations.

Out of the 68 values, ***16 of them are higher*** than the level prescribed for effluents by the CPCB. All the values are ***much higher*** than that of the drinking water standards and the accepted levels for freshwater life.
The values which were high: (alphabet represents column number from the respective excel sheet):

B: 29.3 mcg/l
C: (7 values), 28.4 mcg/l
D: 10.5 mcg/l
E: 10.9 mcg/l
J: 266.6 mcg/l
P: 17.1 mcg/l
Q: 354 mcg/l
S: 52 mcg/l
W: 12.8 mcg/l
Y: 242 mcg/l

The highest value was 354 mcg/l and all the high values are from around the **vicinity of HIL.** (Spot and sediment values available in the supplementary table).

Benxene hexachloride:

Lindane is a neurotoxin that interferes with GABA neurotransmitter function by interacting with the $GABA_A$ receptor-chloride channel complex at the picrotoxin binding site. In humans, lindane primarily affects the nervous system, liver and kidneys, and may be a carcinogen and/or endocrine disruptor. (www.atsdr.cdc.gov)

Common diseases associated with BHC: Chronic liver damage-cirrhosis and chronic hepatitis, endocrine and reproductive disorders, allergic dermatitis, breast cancer, Non Hodgkins lymphoma, polyneuritis.

Accepted standards:

EPA drinking water guidelines: 1 part per billion

Central PCB standard for effluent from pesticide industry: 10 mcg/l

Accepted levels for freshwater organisms (Scottish guidelines): 0.03 mcg/l

The analysis:

A total of 54 locations at Eloor have been tested. The testing was done between 12/3/2005 and 21/10/2007. Most of them have been tested just once. A total of 105 tests were conducted.

The values of the chemical in each of the samples are **much higher** than the EPA standards for drinking water and hence the water in Eloor is not suited for drinking.

Every value was **also much higher** than the accepted levels for freshwater organisms which is the reason for the decrease in the availability of fish and the frequent fish kills.

If the CPCB value of 10 mcg/l is kept as the reference value, ***37 readings are higher*** than it:

B: (5 values), 16.22 mcg/l
D: (13 values), 19 mcg/l
F: 14.4 mcg/l
I: 21.65 mcg/l
M: 32.8 mcg/l
N: 11 mcg/l
O: 56 mcg/l
Q: (2 values), 19.4 mcg/l
R: (2 values), 15.7 mcg/l
W: 10.15 mcg/l
Y: 15.17 mcg/l
Z: 14.8 mcg/l
AB: 19.8 mcg/l
AN: 21.8 mcg/l
AP: 11.9 mcg/l
AQ: 62.64 mcg/l
AR: 14.4 mcg/l
AS: 140.5 mg/l
AV: 24 mcg/l

Highest values were near the HIL factory outlets and the maximum concentration was: 140.5 mcg/l which is 14 times higher than the prescribed levels

Cadmium

Health effects associated with cadmium: Prolonged exposure to cadmium has been associated with gastrointestinal symptoms, kidney malfunction with excretion of low molecular weight protein (β-2-microglobulin). Chronic exposures may cause loss of smell, occasional ulceration of nasal passages, cough, shortness of breath, sleeplessness, irritability, loss of appetite, and cadmium-yellow fringe on teeth. It can lead to kidney stones and osteomalacia.

The disease **"***Itai-Itai",* was characterized by osteomalacia with pain in the back and extreme, difficulty in walking and pseudo fractures. It was induced by environmental cadmium exposure

primarily in post-menopausal women. Cadmium toxicity includes suppression of testicular function and also acts as developmental toxin.

Accepted standards:

EU standard for river water: 1.6 mcg/l

EU standard for river sediment: 40 mg/kg

CPCB standard for river water: 10 mcg/l

Standard for sediment: not available yet.
Accepted standard for freshwater organisms: 5 mcg/l

EPA standard for drinking water: 5 ppb

Concentration of trace metals in various water sources near Bagpur, India around Kodari thermal station, in mcg/ml (Fender and Kharat, 1992) (*Water Pollution*, S K Aggarwal)

Site	Lead	Cadmium
Upstream water	0.85 to 1.30	0.20 to 0.45
Cooling effluent water	21.75 to 25.25	1.2 to 1.5
Machine washing water	18.0 to 25.0	1.25 to 1.35
Downstream water	1.43 to 1.82	0.25 to 0.72
Water from unexposed area	0.55 to 0.66	0.15 to 0.20

The analysis:

A total of 108 locations along the factories have been tested from 2004. Most of the locations have been tested just once; therefore it is not possible to comment on any trend associated with cadmium levels in the Periyar.

The total number of values available are 112.

All values in the available data are higher than the standard followed by the EPA, most of them being ***alarmingly higher*** than the accepted standards. The values are ***also higher than*** the safe level for freshwater organisms.

2 drinking water samples have been tested: (AA, AB) - 0.01 mg/ l

Highest values (all which are higher than the EU standards):

Sediment:

G 27 – 285 mg/kg,
I 27 – 339 mg/kg,
J 27 – 139 mg/kg,
K 27 – 78 mg/kg,
Y 12 – 98 mg/kg,
AJ 24 – 108 mg/kg,
AK 24 – 568 mg/kg,
BL 11 – 70 mg/kg,
BQ 19 – 405 mg/kg,
BU 11 – 355 mg/kg,
CY 9 – 51 mg/kg,
CZ 11 – 323 mg/kg,
DA 11 – 662 mg/kg,
DB 11 – 723 mg/kg

Water:

Highest values:
F 5 - 4.3 mg/l,
V 22 – 2.26 mg/l

Lowest value: BY 39 - 0.007 mg/l, therefore ***except for 1 value, all the values are higher*** than the CPCB standard also. ***All values are higher*** than the accepted EU standard

Lead

Health effects associated with lead exposure:

Infants and children: Delays in physical or mental development; children could show slight deficits in attention span and learning abilities

Adults: Kidney problems; high blood pressure

Anaemia is common and damage to the nervous system may cause impaired mental function. Other symptoms are appetite loss, abdominal pain, constipation, fatigue, sleeplessness, irritability and headache. Continued excessive exposure, as in an industrial setting, can affect the kidneys.

During pregnancy, especially in the last trimester, lead can cross the placenta and affect the unborn child. Female workers exposed to high levels of lead have more miscarriages and stillbirths.

Accepted standards:

EU standards for river water: 2.58 mg/l

EU standards for river sediment: 1078 mg/kg

CPCB standard for river water: 0.01 mg/l

EPA standard for drinking water: 15 mcg/l

Accepted levels for freshwater organisms: 4 mcg/l

The analysis:

106 locations have been tested in Eloor. A total number of 113 measurements were made including those of water and sediment.

*All the values **are higher*** than the EPA standard and hence the water is unsuitable for drinking. The values are also higher than that accepted for freshwater organisms.

High values:

Water:
AH 5 – 83 mg/l, AP 18 - 4.29 mg/l, N 31 – 2.2 mg/l, O 32 – 2.92 mg/l, AG 5 – 1.6 mg/l, AM 8 – 1.14 mg/l, BV 26 – 1.78 mg/l

Sediment:
BS 22 - 256500mg/kg , CN 11 – 2950 mg/kg, CQ 48 – 788 mg/kg, BI 35 – 640 mg/kg, BK 27 – 1500 mg/kg, CJ 20 – 1063 mg/kg

2 drinking water samples have been tested and contain: 0.1 mg/l

Mercury

Health effects: Organic mercury can cause multi system damage, especially to the central nervous system. Inorganic mercury causes kidney damage.

Accepted standards:

EPA standard for drinking water is 0.002 mg/l

EU standards:

Water: 0.18mg/l

Sediment: 7.2 mg/kg

CPCB levels for river water: 0.01 mg/l

Accepted levels for freshwater organisms: 1 mcg/l

The analysis:

20 locations have been tested in Eloor and the total number of values available are 20. Each site has been tested once only. The time of testing is between – 22/11/2004 to 2/2/2005

All are sediment samples

Highest values: B 13 – 0.1 mg/kg, F 11 – 0.102 mg/kg, U 12 – 0.16 mg/kg

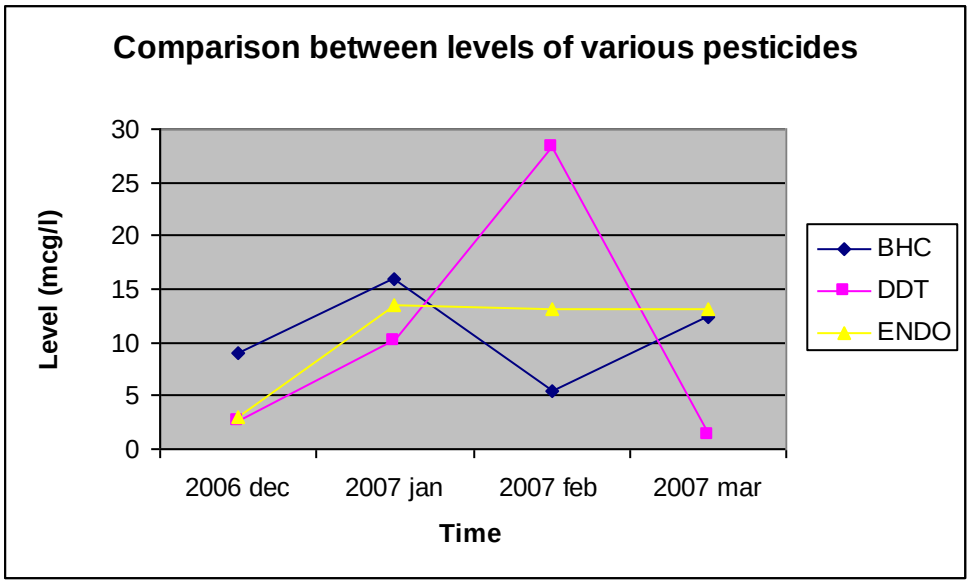
Therefore *all these values were **lower than*** the accepted standards.

An attempt to study the trends of the values:

During the months from December 2006 to March 2007 several samples were tested in the same location and hence an effort to study the trends during that phase has been made here:

The time interval between each row is that of one month

	BHC	DDT	ENDO
2006 Dec	8.968	2.622	2.984
2007 Jan	15.957	10.159	13.513
2007 Feb	5.527	28.398	13.15
2007 Mar	12.35	1.28	13.16

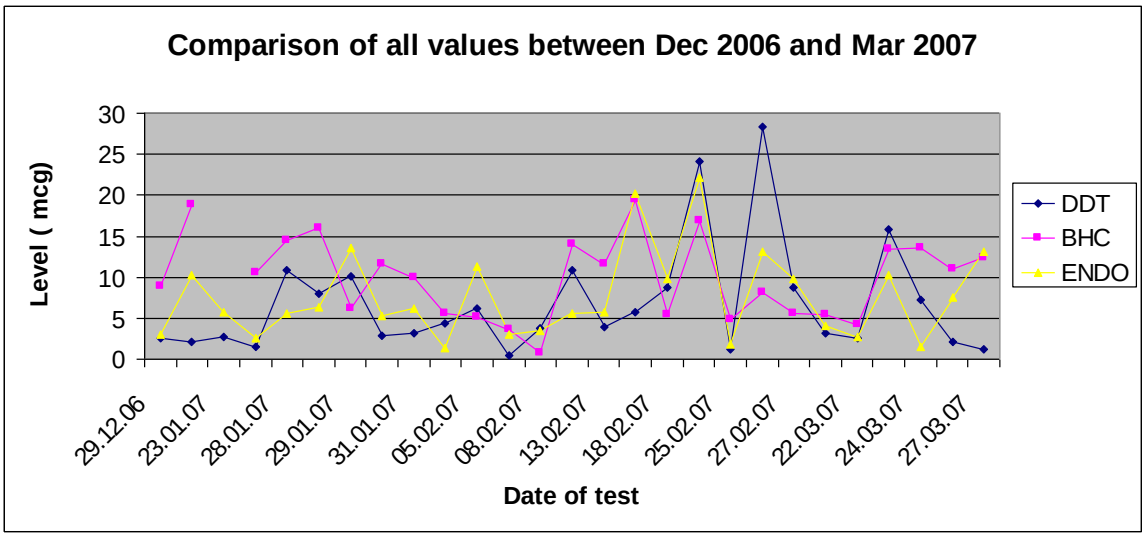


As I have mentioned above, frequent sampling was performed during the months of December 2006 and March 2007 from the same location and all them have been collated below:

	DDT	BHC	ENDO
29.12.06	2.622	8.968	2.984
12.01.07	2.134	18.794	10.216
23.01.07	2.67	na	5.66
25.01.07	1.48	10.51	2.5
28.01.07	10.9	14.4	5.629
29.01.07	8.017	15.957	6.275
29.01.07	10.159	6.214	13.513
31.01.07	2.89	11.65	5.32
31.01.07	3.22	9.89	6.23
01.02.07	4.34	5.63	1.287
05.02.07	6.16	5.08	11.28
07.02.07	0.41	3.6	3.01
08.02.07	3.8	0.74	3.4
09.02.07	10.9	14	5.6
13.02.07	3.923	11.619	5.726
15.02.07	5.8	19.4	20.2
18.02.07	8.7	5.5	9.8
22.02.07	24.157	16.957	22.218
25.02.07	1.243	4.836	1.793
27.02.07	28.398	8.097	13.15
27.02.07	8.77	5.527	9.824
01.03.07	3.22	5.48	4.07
22.03.07	2.55	4.26	2.73

23.03.07	15.79	13.39	10.26
24.03.07	7.29	13.5	1.45
26.03.07	2.15	10.97	7.52
27.03.07	1.28	12.35	13.16

(graph on next page)



The above graph shows that there is definitely no improvement in the values with respect to time and the monitoring has not been used for actual implementation of safety regulations. These high values show the reasons for the ill health at Eloor and the destruction of other life forms in the river and at Eloor.

Conclusion:

From the above analysis, it becomes clear that the water of the Periyar which flows through the Eloor area is rendered poisonous by the industrial effluents. The water is unfit for sustaining aquatic life, for drinking and for domestic use. The high levels of the chemicals are responsible for the ill health at Eloor. The authorities should buckle up and improve the testing procedures, documentation and in enforcing regulation. It is already clear that most of the values are higher than the CPCB effluent standards and hence immediate action should be taken to improve on them.
-A few things can be done from now on to ensure better sampling and hence better regulation:
-Establish the regulations that are to be followed at the Eloor complex for further monitoring.

-Choose a few spots (not more than 10 in total) which are upstream, downstream and near the effluent pipes of the major polluting industries. These should be the only sites from which samples will be collected.

-Collect samples at fixed intervals – weekly on a particular day would be most suitable, or once in 2 weeks – one day sample and one night sample on each of the sampling days.

-Use the above data for monitoring the trends of the problem chemicals. Any upward trend should probe an investigation into the matter. The aim should be to maintain the levels of the problem chemicals below the maximum permissible limits.

-Documentation should be done regularly, and all the reports should be updated on the PCB website.

Interview with Jeeva, Chitradurga

Date: 20th November, 2008

Interviewers: Adithya and Obalesh, Community health cell, Bangalore

Persons interviewed: Suresh, Yogaraj and Chauhan

Jeeva started as a spinoff from a Dalit reform organization called Manjunatha Vidya Samithi, and was registered in the year 2000. The operations began in the year 2004 with the efforts of Mr. Tippeswamy and Mr. Suresh. Now there are 9 active members at Jeeva. Over the years they have made an impact on the issues of manual scavengers in Chitradurga and have received recognition from the municipal officials and the workers. The main objectives of the organization are to improve the lot of manual scavengers in Chitradurga. For this they intend to do the following:

- Educate and change mindsets of the manual scavengers
- Ensure formal education for the children of the scavenger to break the vicious cycle
- Help the families to come out of the profession by taking up alternate professions
- Bring issues pertaining the manual scavengers to the forefront

Chitradurga like many other places in Karnataka does not have good drainage and sewer facilities and hence each locality has an open blind drain called "charandi". This holds good for over 90 percent of the areas in Chitradurga. All these areas depend on the manual scavengers for the cleaning of those drains. The people doing this job belong to the 'Madiga' community which is the lowest caste in the social order. Not all madigas do this job, and those who do it are looked down upon even by others from the same community.

The workers involved in this work are either government employees or contracted through some private firm. There are 116 government or permanent workers and 140 temporary or contract workers in Chitradurga spread out over 35 blocks. Most of these people live in the 32 recognized slums of Chitradurga. Jeeva's work area has 40 contract workers. The difference in pay scale is such that the government employees get Rs. 150 per day whereas the contract workers get Rs. 80. This is the biggest difference, otherwise there is not much difference in the standard of living. There are almost equal number of men and women workers. Only the government manual scavengers have unions. Most of the problems are for the contract labourers who don't have any kind of security.

According to the government records there are no manual scavengers in Karnataka but this is very clearly far from the truth. The ditches they clean contain wastes from toilets and kitchens from homes and also wastes from establishments like hospitals. The content of the wastes include human excreta (95 percent of the waste) and hospital wastes including contaminated instruments like blades and needles. The work includes using a long stick to take out the contents of the gutter and place it on the side of it to allow more waste to collect there. Once the waste dries up they put it into baskets, carry it on their heads and load it into a lorry which takes all this waste 8 km from the location and dumps it. The gutters are usually of the dimension of 2ft width and 2 feet deep. In some locations they are deeper than that.

The workers have accepted it as their fate. They don't see their work as a problem. They don't maintain accounts of their income and tend to over spend. There is a practice of spending all the money they earn on the same day itself and not save anything for future use. Nearly 70 percent of them take small loans regularly from petty money lenders who've taken all these people for a ride and have become rich themselves. This phenomenon of keeping the scavengers under debt has resulted in their continued impoverishment.

There are clear regulations for the provision of certain safety measures for these workers which are prescribed by the government even to the contractors. The provisions are for masks, gloves, boots, and uniform. But the common understanding is that the workers feel very uncomfortable in them and hence refuse to wear it during the long working hours. They feel hot under the boots, masks and gloves. The only things they use are the uniforms and chappals. They enter the gutters with just chappals. There is also a practice of taking some alcohol before entering the drains which helps to tolerate the terrible smell. But according to the documents all the workers have been provided with the safety devices.

There is just no healthcare facility for these workers. A total of 70 to 75 percent of the workers suffer from some kind of illness. The common ones are – skin disease, liver disease and lung problems. On inquiring about why they consume alcohol, there seem

to be a few reasons – to bear the smell of the gutters for a long time and also to feel better in case of illness. Alcohol also helps as a sedative. IPD (explain !) Salappa had conducted a health survey among scavengers in Bangalore 2 years ago and submitted his recommendations to the BBMP but they have not been implemented as of yet.

Seventy percent 70 percent of the families are not providing their children with formal education. Most of the time the children accompany their parents and help them in cleaning. Some of them finish primary schooling and then come for this job. Some of them take over from their parents when the parents fall sick or get disabled.

Jeeva has accomplished the following activities:

- In an attempt to organize them, they've been able to make a group of manual scavengers. This has been more successful among the women workers as compared to the men.
- They're providing training and awareness raising classes for them to change their mindsets about their jobs and lives
- Providing alternative livelihoods like chappal making whenever possible – In 2005, 35 workers were given provisions and loans for starting alternate profession of chappal making and repair.
- Teaching them and assisting them in managing their finances when they receive their salaries. A Self help group has been created for weekly savings of the workers, through which some women have been able to take loans also.
- Reducing the level of alcohol consumption through continuous education.

They are very keen on educating the children of the manual scavengers as they feel that it is the most important tool available to break the chain of bondage. For this, they will be submitting a report to the Sarva Shiksha Abhyan on the number of children in the area by March.

Case studies:

Muthu, a 50 year old man who worked in KB extension, Chitradurga lost one limb to gangrene. The wound started after he stepped on a needle while cleaning a gutter and this infection spread to the entire limb for which emergency amputation of limb was necessary. Now his son works in his place.

Chandrappa is a 40 year old man who is suffering from chronic liver disease (CLD). When he developed jaundice he was admitted to a hospital and stayed there for 2 months. The total bill amount was Rs. 1 lakh. Now he's back to work but continues to drink. On approaching the government, they've agreed to pay 50% of the amount. There is little knowledge on the government schemes available for such situations among the workers or the members of Jeeva.

Nagendrappa is a middle aged man who also works in KB extension, Chitradurga and lost both lower limbs to gangrene. Now someone else from his family is working in his place.

Mental illness contrary to expectation (whose expectation ? isn't alcohol dependence a mental illness – look up ICD -10 disease classification . I understand that most are drunkards – not necessarily diagnosed as alcohol dependence !) is less because the community has apparently accepted it as fate and don't mind doing the job. This is one of the main reasons Jeeva is finding it tough to educate, mobilize and organize them.

They plan to do the following with regards to occupational health in the near future:

- conduct a health survey amongst the workers which they will use for awareness raising and campaigning
- further organize them
- health camps and checkups
- learn about the available government schemes like the ESI scheme.

There is a central government scheme (can you explain the scheme) for the rehabilitation of manual scavengers but the authorities are not implementing it and the workers are not aware about it.
If all the available government programs are implemented then it will be sufficient for the betterment of the scavengers and most of their problems would be solved.
The basic problem is that Chitradurga and many other places in Karnataka don't have a drainage system. The officials are too lazy to consider improvement of drainage facilities and prefer to use the system of manual scavenging. Without adequate pressure there will not be a change in this system.

An article from my blog, through the learning I got at CHC:

The 'Special' dilemma:

When I was studying my final year at medical college a professor made a joke "Soon we will reach such a high level of specialization that there will be a 'Left index finger' surgeon". Of course we all laughed at the idea of such a thought.

Through ever increasing number of 'experiments' and 'research' there is now so much literature and technique that each subject needs so many sub-divisions which further need more sub-divisions. Many sub-divisions have now become subjects on their own. How does this affect the environment (when I say 'environment' I mean 'everything')?

The physiology lecturer needs a kind of frog which breeds only in a lake from a village which borders of Western Ghats Sanctuary. Medical students can learn about muscle and heart functioning from experimenting on the frog. Therefore there is a demand for the frogs. The tribal have been displaced from the forest by the government officers in the name of 'conservation'. For a living they have few options, therefore they catch the frogs for the medical college lab. Due to relentless catching of the frogs (coupled with chemical run-offs of pesticides and fertilizers from farms and also climate change) the numbers decrease to such an extent that the lab get fewer by the month. The conservationist blames the tribals for the threatening the species of frogs. Alongside all this, a malaria epidemic occurs in the village after a long time. The local medical officers order DDT to be sprayed in the area and give drugs to all the susceptible people. This decreases the frog population even further.

The doctors do not know about (or are not concerned about) the fact that the frogs are the keystone and indicator species in the ecosystem which keep insect populations under control. They just want the frogs for the experiments. The conservationists donot know that the doctors are the ones creating the demand for the frogs. The tribals just need some money to get some food to stay alive. The frogs disappear and hence the mosquitoes increase creating a situation for malaria. The local medical officers are taught that DDT is the only solution for malaria producing mosquitoes. They're only worried about malaria. The tribals have to move on to other jobs. The above situation is just a small example I've given to show the blindfolds within which each of us are probably working.

This specialization business is not just in the academic circle. In every area of enterprise, anywhere from production to consumption there is now a highly 'evolved' division of labour. There are so many things to take care of that people are needed for so many jobs. Since the job becomes very specific, the only thing the person becomes concerned about are the inputs and the output of her/his job. They are not very concerned about where the raw materials come from, how they've come and who brought them. They have the raw materials and are expected to make something out of them. Once something has been made from the raw materials, the first level products are taken to the next level of assembly and so on and so forth. After the chain of events, the products reach the level of consumers.

People want cars. The car manufacturer wants the iron and steel, the iron smelter needs the ore. Iron ore is found usually in thickly forested areas and hence is a major threat to them. The person who is getting the ore mined wants to minimize his costs to give the best price to the smelter and hence he orders open-caste mining to be done. This destroys the forest. But he gets good customers as the price for his ore is the cheapest. The Smelter uses inadequate pollution control mechanisms to minimize his costs and hence releases lots of chemicals in the air and heat into the rivers. The car manufacturer

gets all this and produces a hybrid car and calls it 'eco-friendly' and the seemingly 'conscious consumer' buys the car to show that he is concerned about the environment.

What are inter-disciplinary sciences? In the realization that people are losing perspective of the inter-relatedness of everything, some forums and academies have opened where people look at subjects from more than one perspective. This ensures more responsible science and also it has become a necessity to take research further.

Holistic perspective. The key ingredient missing in today's world. Everyone is so busy playing their 'parts' that the 'whole' becomes irrelevant. It has hence led to a situation where each one does not consider the other's problem to be his or her own. Each person has his own way of dealing with each problem and feels that there's no need for a holistic approach. Only with the advent of such a perspective can one hope for the environmental situation to get better.