

MODERN REALISTIC ENVIRONMENTALISM

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Makesh Karuppiah, Ph.D:
A Passionate Environmental Scientist

True contribution to Environment with passion.

Written by

Makesh Karuppiah, Ph.D:

Environmental Scientist & Information Technologist

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It is very easy to contact me through email - makesh@gmail.com and I will respond as soon as I can.

Epigraph Page

“Earth provides enough to satisfy every man's needs, but not every man's greed.”

“What we are doing to the forests of the world is but a mirror reflection of what we are doing to ourselves and to one another.”

“The greatness of a nation can be judged by the way its animals are treated.”

“Poverty is the worst form of violence. Recall the face of the poorest and weakest man you have seen, and ask yourself if this step you contemplate is going to be any use to him.”

“If we are to teach real peace in this world, and if we are to carry on a real war against war, we shall have to begin with the children.”

“Always aim at complete harmony of thought and word and deed. Always aim at purifying your thoughts and everything will be well.”

– Mahatma Gandhi

“Keep close to Nature's heart... and break clear away, once in awhile, and climb a mountain or spend a week in the woods. Wash your spirit clean.”

“When one tugs at a single thing in nature, he finds it attached to the rest of the world.”

“In every walk with Nature one receives far more than he seeks.”

“Between every two pines is a doorway to a new world.”

– John Muir

Table of Contents

1. Fundamentals of environmentalism	9
2. Being Simple in Environmentalism	17
3. Starting point of Environmentalism	20
4. War and Environment	24
5. Poverty and Environment	28
6. Factors affecting Environment	35
7. Economy and Environment	53
8. Greediness	58
9. Carelessness	62
10. Lawlessness	65
11. Sustainability	69
12. Solutions for Environmental Problems	75
13. Environmental Awareness	79
14. Environmental Passion	83
15. Environmental Actions	89
16. Follow up and Improve	94
17. My Contribution to Environment	110
18. Modern Realistic Environmentalism	123

List of Illustrations

Figure 1- A Scenic Photo	12
Figure 2- Purslane Plant	13
Figure 3- Trying Gandhian - Be Simple Principle	18
Figure 4- Tree Saplings Ready to be Planted	21
Figure 5- Converting Sterile Land to Naturally Fertile Land	22
Figure 6- Yosemite Granite – El Capitan	27
Figure 7- Poor People Living in Nature Sustainably	32
Figure 8- Used Tires – Solid Wastes	48
Figure 9- Going Green	57
Figure 10- Yosemite - Half Dome - A Granite Dome	59
Figure 11- Wonderful Palani Hills	60
Figure 12- Beautiful Western Ghats Mountains	61
Figure 13- Garbage Strewn Across Railroad	63
Figure 14- Magna Carta – Freedom under Law	67
Figure 15- Sustainable Growth	69
Figure 16- Converting Waste Materials into Eco Bags	77
Figure 17- Protecting and Restoring our Water Resources	80
Figure 18- Save the Bay	81
Figure 19- Vote Yes on 1	82
Figure 20- Color Removal from Pulp and Paper Mill Effluent	84
Figure 21- Copper Absorbed by the Plant Stem	86
Figure 22- Collecting Sediment Sample	87
Figure 23- EA Farms Model	93
Figure 24- Natural Sustainable Water Treatment	96
Figure 25- My Scientist Friend Dr. Hatha in Arctic Area	119
Figure 26- My Brother Sekar - From IT to Farming	120
Figure 27- Geetha's eBooks	121
Figure 28- A Beautiful Male Cardinal	122
Figure 29- A Colorful Macaw	128
Figure 30- A Passionate Environmentalist	129

Introduction

As an Environmental Scientist, I am always fascinated by our environment. I always have passion for water environments and love watching them even if it is a small creek or an enormous ocean. I had passion for science from childhood especially for biology, zoology and chemistry along with mathematics. Obviously, took biology as my major while doing my undergraduate degree. I fell in love with these subjects and got more involved when I was introduced to limnology and biotechnology. Environmental Science is a subject where you can bring in any other subject and relate it. Economics, human health, statistics and any other subject you can name is tied to the environment. As a human being you are tied with the environment even if you are against environmental policies that save the environment for future generations. I have read articles that voice against climate change, issues from greenhouse gases, fossil fuel usage and other environmental damages. I tend to see those arguments as a motivating factor and do my part towards promoting better environment especially for the future generations to come. Think about a future with children walking with oxygen tanks and masks, acid protecting umbrellas, drinking colored water tainted with pollutants, eating unhealthy food contaminated with heavy metals and cancer causing chemicals. If we do not take small steps towards saving the environment, our children will be living in an unhealthy chemical environment. They will breathe polluted air, drink contaminated water and eat chemical tainted food. This book is a small step towards environmentalism that needs to be followed.

In this book some of the areas would seem to be an autobiography. Yes, I agree it is an autobiography of an environmentalist who has a passion for the environment. Sometimes it may be a conversation directed towards you, the reader, or others. It is my idea of environmentalism and wanted it to be simple, especially I want the children to understand and practice environmentalism. I also made sure that at least some of us cared for their future living conditions and environment. Some environmental jargons are also used but I made sure it is easily

understood. That's the reason there some simple topics in this book such as greediness, carelessness and lawlessness.

Environmentalism

As we move towards a more scientific oriented planet, we tend to destroy the environment. Billions of people inhabit this world and are using more and more scientific inventions. Laptops, desktops, tablets and cell phones are some of the few electronic goods that we cannot live without. Manufacturers want to introduce newer products every year and older products never get one hundred percent recycled. If a billion people buy a new electronic good replacing their older one, one billion units of electronic waste is produced. Where do all these wastes end up? So many harmful chemicals are also present in those goods and they enter into various environments and eventually enter into human systems. We hear so many young people suffer from dreadful disease such as cancer and die at a young age. If we have not invented all these goods or used those conservatively, those people might have escaped from those dreadful cancer diseases and lived a healthy life. What is the root cause of all these problems? Greediness. I can write several pages on greediness and its effects on the environment. As a reader you may have a question that we need to grow scientifically and we need all this improvement for human kind. I agree with the reader on that, but here is where sustainability comes in. Sustainability is a vast topic and if one needs a simple example in a sentence, then the following sentence is one such example - Consumers should use one cell phone instead of two phones. Environmentalism should come to people as a habit and sustainability should be practiced by everyone. Each and every person needs to take actions to practice environmentalism and this book can guide you on this.

Makesh Kumar Karuppiah, Ph.D

MODERN REALISTIC ENVIRONMENTALISM



Makesh Karuppiah, Ph.D,

Environmental Scientist & Information Technologist

“Try not to become a man of success. Rather become a man of value.” – Albert Einstein

With that in my mind and my motto –

MAKE Something Happen, I wrote this Modern Environmentalism book. The material for the book flowed through mind like a river. This book represents my views, my life journey as an Environmental Scientist and Information Technologist. I want to contribute something to my passion – “Environment” and that is this book. It is focused to be read by diversified people and I wanted it to keep it simple. There are some complex chemical names and environmental jargons; however, it can be read by a child and be understood. That is the aim of this book – simple but reachable to extensive audiences.

I dedicate this book to my family, friends and teachers, who molded me the way I am now and have equal environmental enthusiasium.

FOREWORD



COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF MARINE BIOLOGY, MICROBIOLOGY & BIOCHEMISTRY
SCHOOL OF MARINE SCIENCES, Fine Arts Avenue, Cochin - 682 016, INDIA

Dr. A.A. Mohamed Hatha, Ph.D.

Professor

Fulbright Scholar

I deem it a pleasure to write the foreword for the book ‘Modern Realistic Environmentalism’ written by my dearest friend for past 25 years and staunch environmentalist Dr. Makesh Karuppiah. We learned the lessons in environmental sciences together at the Department of Environmental Sciences, Bharathiar University, Coimbatore, India in the early 1990’s. The learning soon translated into action as we were deeply involved in a project on ‘Energy production and Demonstration Programme (EPDP)’ funded by Department of Non-Conventional Energy, Govt. of India. This project involved greening nearly 200 acres of barren land in an arid zone in the foothills of Maruthamalai. With the creative and able support of our Prof. Dr. Lakshmanaperumalsamy, our team of researchers and students soon sprung into action and over a period of next five years we have really witnessed and experienced the change the greening has brought in an almost dry area. Small check dams were built to save the land run-off which was effectively trapped for the requirement of growing trees. Along with greenery, more and more animals and birds started visiting the campus and it was a pleasant surprise to spot peacocks in the front verandah of Department of Environmental Sciences. In this context I would also like to mention our team of nature lovers namely, Dr. Chandra Shekar, Dr. Gomathinayagam and Dr. Dharmalingan who almost made it a practice to visit wild life reserves such as Parambikulam, Indira Gandhi national Park, Nilgiri biosphere and Silent valley on a regular basis.

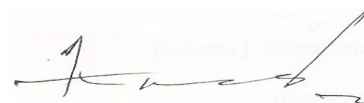
It is after experiencing the nature at first hand Makesh left for USA to pursue his Ph.D in Environmental Sciences and explored the pollution aspects in the Chesapeake Bay as a research scholar at prestigious University of Maryland. This research has resulted in good quality publications in refereed international journals. Though Dr. Makesh was initially employed as an

information technologist, he always kept environmental science close to his heart and engaged in activities related to environmental protection. He along with his brother Sekar (software engineer turned full time farmer) pumped in lot of their hard earned money to develop considerable area of dry land in their native village at Pollachi to EA farms, an organic farm developed through sustainable environmental friendly technologies. I had the good luck to visit this farm and experience the ambience. As it is considerably parched land the growth of the plants were slow, but the efforts were completely environment friendly and sustainable. It was also not a surprise to me when I visited Dr. Makesh at Florida as a Fulbright Scholar our first visit was to Everglades, the vast expanse of wetlands along South Florida. I was really wonderstruck to see the diversity of wild life at this huge natural reserve, especially the alligators and crocodiles, and immensely thankful to Makesh for that experience.

It is in this backdrop I would like write the foreword about ‘Modern Reality Environmentalism’ by Dr. Makesh. As a person who experienced nature at close quarters, he is really convinced that ‘Nature’ has everything to offer for man’s need, but not for his greed. The book starts with quite some inspiring quotes for the young minds he is targeting through this back. After living in a developing country during his formative years and then moving to most developed country in the world, he has also witnessed the perils of wanton destruction of nature and the effects of careless and unsustainable modes of consumption. He is highlighting the incidences of cancer and other life style diseases in the current generation and linking it meticulously with environmental pollution. He would like to stress the fact that the natural resources are finite and all living and non-living things on planet earth are interconnected. Fast paced development and unsustainable consumption patterns are affecting the balance between living and non-living as well as within the food web and food chain, which is reflected in the form of water, soil and air pollution the effects of

which are ultimately getting back to humans, the most advanced forms of life on planet earth. Dr. Makesh has thoughtfully identified and elaborated in this book, the root causes of various forms of pollution and remedial measures to slow down/ mitigate the effects of pollution. The book in fact has 18 simple chapters which are easy to read, follow and practice. Being a fan of science I feel it is very important to be aware of the problem and behave in a proactive manner so that we could affect a change. Dr. Makesh rightfully identified the students as the medium of change and narrates his personal experiences with student community in creating awareness among them. Instead of the normal 3 R’s of environmental protection such as reduce, reuse and recycle, he has also brought in 2 extra R’s very imaginatively into the existing 3R’s. He feels that the first point of action should be refuse if it is not really needed. His mantra is refuse, reduce, reuse, recycle and recover. He has also brought out an impressive flow chart about modern environmentalism, which is quite simple to understand.

In a nutshell, the book ‘Modern Reality Environmentalism’ is a reflection of Dr. Makesh’s commitment to nature, as he wisely understood that it is in everybody’s interest that we keep nature as undisturbed as possible. The text is simple and interlaced with good quality photographs which make the reading a pleasant experience. It is also oriented in a very practical manner so that the readers should further progress onto action so that the objective of environmental protection could be achieved in an effective manner. I take this opportunity to congratulate Dr. Makesh to come out with this wonderful contribution and sure that it is going to make the world a better place to live.



(Prof. A.A. Mohamed Hatha)

Chapter 1



Fundamentals of Environmentalism

"Practicing sustainability without greediness and with simplicity along with motivation to reduce, reuse, and recycle."

First Environment - Just close your eyes and think that you are living near a stream with green plants and trees, quiet and calm with just birds chirping.

Second Environment - Now again think that you are living in a concrete jungle with smog to inhale, cell phones ringing and in a stressful atmosphere.

As an environmentalist, I would choose the first living environment. As people who need money for survival, we have no choice but to choose to live in the second environment. Most of us live in a concrete jungle, inhale polluted air, eat pesticide contaminated food, drink tainted water and intake chemical medicines for survival. The objective of this book is to introduce people who live in the second environment to environmentalism and closely achieve the conditions of the first environment.

Now, let us move to and understand some of the fundamentals of environmentalism. First let us concentrate on greediness. Is there a proper explanation of greediness? The answer is no. We may think as an individual we are not greedy. However, we live in societies. Even though we may not be greedy, our society or our country may be greedy. So indirectly we are involved in greediness. To make it simple, I may be an environmentally friendly person driving hybrid cars, but I cannot

stop people driving gas guzzling vehicles. Again driving hybrid cars does not mean that I am saving the environment. We contribute pollution to some other area in a lesser manner. That is a whole different topic by itself. The main point here is I am reducing the pollution load by driving a hybrid car instead of driving a huge car. I am not against the huge car also; I am just against the usage of the huge car. Meaning if a whole family is using the car for the purpose of travel, then it is better. However using the huge car by just one person is what I consider bad for the environment. This is what is called environmentalism or practice of environmentalism in the modern world. Justify the usage and do not use anything without any rationalism. However as an environmentalist, I will do my part and try to change the person who drives the gas guzzler to use his vehicle wisely. Even if I could change one person, I would feel that I achieved success as an environmentalist.

An example of individual greediness - We start with one cell phone, and then we add another phone such as one for personal use and another for office use. Phone companies release upgraded phones every year with more attractive features. Now we tend to have the latest phone just for the sake of it. This is what is called individual greediness and affects environment directly. We have now three electronic wastes in the making. If one greedy individual can introduce these many wastes into environment, then multiply that by one billion. Enormous amount of wastes will be generated. These wastes are exported to underdeveloped countries. Again, greedy people to make some monetary gains buy these electronic wastes and make children to work on it. These children without masks and gloves burn some of the electronic wastes called eWastes and inhale most toxic air pollutants directly into the lungs. These children may die because of lung cancer at a very early age. One person's greediness to use more cell phones would cause a death of a child that had labored in an underdeveloped country. The cell phone user might have been a very good law abiding citizen and even contributing to good things. However in this case, the same person affected the

environment and health of a child indirectly. My intention is to create this awareness to the user and reduce the use of unwanted and even the necessity things. The above narration indicates how just one individual could cause these serious effects. Overuse of anything is against environmentalism. Think about a developed country doing these types of acts as a whole nation and it would cause deleterious effects in the whole world.

I used to spend my time in a greener area surrounded by sustainable villages and enjoy monsoon rains during my childhood. Later I moved to a developed country for my higher environmental education. During one my recent day visit to my birth place, I noticed windmills. I was happy that a natural resource such as wind being used and felt good about the windmills. Each windmill is owned by rich individuals. After very few years my happiness vanished seeing thousands of windmills at the same place. Here greedy business took over the environmentalism. Even an illiterate but experienced agricultural woman told me due to enormous number of windmills the climate pattern in the region changed. These windmills were even dispersing the rain clouds that were formed. Agriculture was totally lost and lush green is not there anymore. Now it looks like industrial town rather an agricultural town.

Sustainability when practiced in any field directly promotes environmentalism by itself. When an individual has the capability to buy a gas guzzler

but drives an environmental friendly vehicle, they are being sustainable. This can be easily practiced by both rich and poor. Sustainability without greediness should be the focus and fundamental objective of modern environmentalism.

Figure 1- A Scenic Photo



Each and every living organism is interconnected in the environment. Some imbalance would cause unwanted effects on every part of it. I had a privilege to work with a small ornamental plant for my masters' research called *Portulaca oleracea*. It is commonly known as purslane. Even though it is a small plant it has so many benefits. It has best and most Omega 3 Fatty Acids on the vegan side. I used this plant's sensitivity to the heavy metals present in the environment. My study showed it can easily separate and accumulate metals from environment. Recently I came to know about a product called Plumpy'Nut. Mr. André Briend from France formulated Plumpy'Nut, a peanut-based nutritional paste that has been successfully used to treat severely malnourished children all over the world. It has saved several

children who were underfed. Even there has been reduction on illness and death from malnutrition. This type of research should be highly appreciated and should be awarded a Nobel Prize. This product single handedly eradicated malnutrition from several poor countries. I wanted to add the vegan Omega 3 Fatty Acids from *Portulaca oleracea* into the Plumpy'Nut, so that when the malnourished children consume them, it increases brain power so they can study better.

Figure 2- Purslane Plant



When education levels increase in any society, that society can thrive better and eradicate poverty. Also, it helps to create better environments. At that same time in another part of the world people were adding a harmful substance called **Melamine** to show high levels of protein in milk products. Ingestion of melamine may lead to reproductive damage, or bladder or kidney stones, which can lead to bladder cancer. Milk products are consumed by kids and as an Environmental Toxicologist, I think it affects them more than the adults because of their age (organs are not fully developed in kids). Later these greedy people who added melamine were given capital punishment. But whatever damage that has been already done to the children who drank the

melamine tainted milk is irreversible and they have to live with that. Business people who are focused only in money making have masks in their eyes towards environment. They taint foods, milk, toys and children jewelry with lead. Lead is known to cause environmental health problems mainly damaging brain. They sell chemically tainted walls which have affected people's dream homes. These are ruthless people with high levels of greediness who do not care for human health and the environment. My intention is to create awareness among these people to correct themselves and move towards better business that helps human health and environment.

In the 21st century, I know places where people go to the toilet publicly and everywhere. We all know places where poverty is present at an unprecedented rate. A few people who rule and have power live luxuriously while their own fellow countrymen starve and live in poverty levels that one cannot even think of. This happens due to the fact that the ruling people in those countries are greedy and corrupt and really don't care about their own people and their environment. One of the main aspects of today's society is the dependency on medicines. We live in a greedy society who wants to make money at any cost. They don't care about any other thing. Already people face so many factors that are affecting their health. Air, water and soil pollution are common now along with pesticides and insecticides tainted foods, carbonated drinks, unlimited organ damaging alcohol consumption and habits of cigarette smoking causing cancer. All of the above factors cause severe strain on the human body. Several incidences of diseases such as diabetes and cancer are caused by such factors and are prevalent in every country. All of these are because of the greediness of several people who want to make more money. For example, a pesticides manufacturer wants to sell more pesticides and insecticides than required to the farmers. Farmers use them in more quantities than required to produce more. Farmers are also injecting Oxytocin directly in plants to increase the size of vegetables and in cows to increase milk production. This indirectly enters the human system and cause untreatable

effects such as hemorrhage, heart, blood pressure problems and brain damages. This increased greed of farmers can affect health of future generation. However, there is one group of people, who with ultimate greed surpassed every greedy person so much that they need to be punished by the ultimate punishment. People whose bodies are stressed by many factors end up with dreadful diseases and have no other choices than consuming medicines. These groups of ultimate greedy people were those who sold expired medicines by re-labeling them with a new, 'later' expiry date. As an Environmental Toxicologist, I cannot even think of the effect that expired medicines would have caused to the wide variety of diseased people. Believe it or not such greedy people live among us and it should be our aim to create better future generations without such greed. Children should be taught that material and money is not important as people, environment and sustainability. They should be taught to use less rather than consume more and waste more. It is important to teach them that even though they can afford more things they should practice sustainability rather than buy everything at their will and throw most of them as waste. Reduce, Reuse, Recycle and Recover are the most important R's of the modern environmentalism. We cannot completely stop modernization now, so it is better to practice sustainability and important R's of environmentalism in this era and teach them to our children. If we teach those important things to our children we will not have the ultimate greedy guys who would taint foods, medicines and environment. In modern environmentalism another R is added in front of already existing R's and that is Refuse. A nice example of refuse would be that if you have a working phone and did not buy a new phone for the sake of prestige in having a latest phone – that would be a Refuse. Finally to end all the R's is a D – Disposing the waste properly.

Refuse -> Reduce -> Reuse -> Recycle -> Recover -> Dispose Properly is the hierarchy.

When these fundamentals of environmentalism such as eradicating greediness, practicing sustainability and using important R's are followed, pollution will automatically subside. Again I will use India as an example for how it is being affected environmentally. Those who traveled in India know about the traffic nightmares. I read somewhere that if one survives after driving in Indian traffic, it is that person's pure luck. However, India is target for all car manufactures and sellers. Every car company wants its presence in India. They want to sell more and more cars despite the congested roads can accommodate. Think about a billion people driving cars and the havoc it can cause on the congested roads and pollution it can cause to the environment. Air pollution does not have boundaries. Already all countries are facing air pollution effects. Sulfur Oxides (SOx's), Nitrous Oxides (NOx's), acids, and chemicals are no joke. Climate change and greenhouse gas issues are made fun by people for political reasons. It is not fun when we lose people to flooding. We all live on the edge of a thin wire. A small imbalance can cause unpredictable consequences, so it is better to start practicing fundamentals of environmentalism as soon as possible.

Once fundamentals of environmentalism are practiced, pollution automatically reduces. Let us consider a family of four. If this family of four can efficiently use a single car instead for four cars, it can significantly reduce its pollution input into the world. This practice not only saves environment, but also helps the family with monetary savings also. This family after saving the environment, increasing their monetary savings, planting trees around their house, minimizing their garbage, and practicing environmentalism, is finally considered as an improvement of the environment. If that family shares their knowledge and experience of environmentalism to their friends, community, village, town, city, county and/or country then they become environmental awareness creators. If one family's input is this much, think about how if more families participate and follow environmentalism - it could change the world into a better place.

Chapter 2



Being Simple in Environmentalism

Being simple is another important feature of environmentalism. Eradicating greediness makes people to live simple. It also helps to lessen stress levels in humans. Living simple life in an ashram kind of environment will be dream of several people, but in this fast world it is not possible. So it is important to practice at least some of it in the fast paced world. It is very difficult to be simple in the current society and environment. However by practice it will come as a regular thing in life and even make one more productive by being simple. Instead of driving a car, let us say a worker drives bike to work even though he could afford luxurious car - Now the worker is considered as being simple. The worker not only decreases his contribution to pollution by being simple but also would be healthy by doing the exercise of riding the bike. The worker can also have car that gives good mileage for long trips if there are no public transportation is available. There are endless benefits of this action of being simple both to the worker and the environment. If more people do this, I am sure societies will turn better. Great leader Mahatma Gandhiji practiced simplicity easily and every day. Most of us cannot practice simplicity or it is not even possible to expect to live with such simplicity. If we practice little bit it will take us to great heights and also save our environment also.

It is easier to write about simplicity than practicing it. I have been getting good education from childhood in India and want to complete my PhD in United States, get a good job and aimed to drive luxurious cars. As time went by, my intentions

changed and wanted to live as simple as possible. Still I am in learning curve and will one day achieve more by living simple and practice environmentalism.

Figure 3 – Trying Gandhian – Be Simple Principle



What is required for a human being to live comfortably – a good house as a shelter, good food to eat, vehicle to travel and good business or job to earn money for all the materials. These comforts are achieved by more and more people in the world through the means of education. However there are lots left behind. How should they be brought into the comfort zone? Only

politicians who can device projects could bring them into comfort zone. But most of them are becoming corrupt and accumulate enormous wealth which becomes useless in a bank. Most of the politicians should live simple, and help people who are not in comfort zone to come into the comfort zone. These politicians should leave out the greed when they enter into public life and work for the poor people who do not live in comfort zone. They need to provide ideas of educating the children from non-comfort zones. These types of activities would turn a community into a good community and make more and more people living in comfort zone with sustainability and simplicity in mind. Once we have educated people practicing sustainability, simplicity, environmentalism thrives on its own.

BE SIMPLE

Chapter 3



Starting point of Environmentalism

Where does environmentalism starts? It starts with every individual. Let us consider two individuals to discuss this topic: Mr. Pollute and Mr. Environ. Now, let us see the life style of Mr. Pollute. Mr. Pollute lives in a 5000 sq. ft house. He drives a gas guzzler. He holds all the latest electronic gadgets. He has TV in every room. He has various kinds of computers – desktops, laptops, tablets and cell phones. He doesn't care for environment. He removed trees around his house. He is against all greenhouse effect and climate change theories. His garbage can is always to its full capacity and never uses the recycle bin.

Mr. Environ lives in a small environmental friendly house. He has renewable energy sources for his utilities. He recycles water. He has full of trees and garden that produces vegetables. Mr. Environ has one TV, a mobile computer and a cell phone. He cares for environment. He is worried about greenhouse gases and its effects on climate change. His garbage is very little and he uses recycle bin to its full effect.

Most of the people reading this would support Mr. Environ and wanted to live like him. In real world, there are many people like Mr. Pollute. If we carefully analyze the economics of these two characters, Mr. Pollute will waste most, both environmentally and economically. Mr. Environ will have benefits on both aspects and will also not be affected by health hazards too.

There is always a starting point, by which Mr. Pollute can change. He can plant trees around his house. He can turn to solar,

wind and bio resources for his power consumption. He can reduce his unwanted electronics and eWastes. He can drive better vehicle that gives good mileage and lets less pollution. By leading such life, Mr. Pollute can eliminate producing more garbage and also use his recycling bin to save environment. This will save him enormous money over time. The important thing is every human should start at a point where they think they could save the environment. That can be as simple as using recycle bin to dispose their plastic wastes. Adding one by one good practices to such starting practice will make one person to be more pro-environmental.

Figure4. Tree Saplings ready to be planted



Planting trees, reducing any resource usage, recycling used materials, creating environmental awareness – any of these activities can be a starting point for an environmentalist. You become a true environmentalist when you feel bad at any action that you do affects environment.

Figure5 – Converting Sterile Land to Naturally Fertile Land



In this modern age we can easily pollute the earth in many ways. It is getting tougher and tougher to see a clean environment. We have to work together and without individual environmental responsibilities it will be very tough to maintain a clean environment. Every aspect of ecosphere is constantly being threatened. Lands, Atmosphere, Oceans, Mangroves, and Estuaries are daily degrading. We have to take proper steps to protect them.

Chapter 4



War and Environment

Leaders have shown us even before several years to be peaceful. But people did not learn that yet. We brothers and sisters of the globe are still fighting in this 21st century. How many wars are still going on this earth even in this 21st century? One cannot count easily. War destroys everything. People are killed, families are devastated and environment is destroyed. When people run for the life, how would they think about saving the planet? Destroying is very easy and in current world we have made it easy. Creating anything has become more and more difficult. Slowly and steadily, people love to sit in front computers, TVs and other electronic devices and start waging war on one other. Environment is starting to get completely ignored. If this goes on, one day we will be living in enclosed bubbled biosphere where we will be connected through enclosed tube to our car. We will have to pay for maintaining the oxygen level in our biosphere and in our transportation.

Even conventional war takes a toll on everything including environment, think about chemical and biological war. People spend so much on improving the weapons so it can damage more and more. Very less people think about the positive things for the Earth. How to manage the climate, keep our Earth clean and protect it, how to reduce pollution – all these topics take a back seat. These types of positive spending are much lesser than the destructive war spending.

More and more people are getting well educated than before but as a group, Homo sapiens how failed on the earth to live peacefully, sustainably and positively. During the history we have learned that the negative person who leads countries into war has never won. Why can't the future leaders think rationally to avoid

wars? A simple person's positive think against war can even work. I consider me as very simple person who does not have any power what so ever against anyone and I love to be like that. One day I was reading about there was huge tension between South Korea and North Korea. Already there were so many wars going on and still going on. I really felt that this war should not happen. So I prayed that this war should not happen and even blogged on November 29, 2010 my thoughts. It goes like this:

One more prayer: We don't need one more senseless war - Praying to bring peace for North and South Korea brothers and sisters.

Somehow that war did not happen and I felt that my prayers stopped that war. I still pray that one day on this mother Earth all the wars will be over and we all will concentrate on how to improve quality of each and every human being to live sustainably and in harmony with nature.

Mountains with minerals have been bombed, beautiful valleys, oceans and every environment has been destroyed in wars. Good people with good heart, who had lived and enjoyed the environment where they have born, must have bled in their heart seeing the war destroying the environment of their beloved place. If the war had not destroyed their place, they would transform those places into more serene environment with flower beds and fruit trees which would have brought the beautiful singing song birds. This dream of mine in which people work harmoniously gives me goose bumps. Hoping and praying for that to happen in my lifetime.

If I had a choice to build a weapon that can destroy my enemy and his place where a grass will not grow for 100 years OR

To help my enemy to share my knowledge of how to change enemy's war torn area into an excellent sustainable environment area where they can live peacefully,

I will blindly prefer the second option. I pray each and every person to love Mother Nature and provide their experience in bettering the nature.

Let us hear few statements of war and the environment topics I am talking about:

War:

- 1) I killed thousands of my enemies. Hope their kith and kin are suffering a lot.
- 2) I damaged the whole country. Every child will be born with deformity for at least hundred years and not even grass will grow in that country.
- 3) I bombed and damaged the whole harbor. They will not be able do any good business for several years and it will cause economic instability in their country.
- 4) I bombed their important buildings and killed several people by which they lost all their freedom and are afraid to even go out.
- 5) I killed every person including their mothers, fathers, girls, boys and pets.

Just read the above sentences again it brings so much negativism in one's mind. While writing all the above sentences, I felt bad and evil has taken over me. How can one take a pride in doing such things, that too in this 21st century?

Let me write five positive sentences:

- 1) I helped to remove poverty from a whole country. Every people are having food and shelter now. People are focusing on sustainable agriculture and producing their own food.

- 2) I helped to eradicate malnutrition from a whole country. Now children are growing healthy and they are able to acquire the knowledge to judge what is good and bad.
- 3) I helped a war torn nation into a sustainable natural agricultural country and people are living harmoniously.
- 4) I helped in providing education to children and people who could not easily get it. Now they are able to pass their knowledge to other unfortunate people.
- 5) I helped in stopping negative things in a country and helped them to rebuild their nation towards productive growth.

Now read the above sentences again it brings so many positives to one's mind. While writing all the above sentences, I felt good and peace has taken over me. Any leader can take pride and feel completeness of his or her life, if they had any of the above. Whatever war has happened before has to be left out and all young children with uncorrupted mind to move towards a positive Earth.

It takes millions of years for mountain to be formed by different natural slow and steady process. You feel the majestic of mountains when you are near them such as Yosemite Mountains or any mountains in the world. Mountains provide important minerals that runoff from to the valley and enrich them. These minerals are very important for the ecosystem. Also mountains are very aesthetic and each and every moment they look different and beautiful. You just stand in glacier point and view half dome breathe cleaner and fresh air watching sunrise, afternoon clear skies, sunset and snow covered mountains - it is just a magic of moments.

Figure6. Yosemite Granite – El Capitan

How long it takes to destroy a mountain - few seconds. Heavy bombing could flatten the mountain within few seconds. Resources will be lost and the mountain becomes deteriorated in few minutes. Even in non war areas people for the greed of granite and marble – they flatten the mountains as soon as possible. It is sad to see these majestic million year mountains go down within few minutes. People should pay respect to these mountains and nature before they take drastic measures. War and environment never go together. Human Kind should help each other instead of fighting war with each other. Everyone should live happily on mother earth by loving each other and not hating each other. One should not feel happy on others misery. Mother earth has plenty of good things to provide and we have to save that and improve our lives instead of spoiling everything.

Chapter 5



Poverty and Environment

When people don't have food due to poverty, how would they care for environment? So how would one create awareness to create better environment in poverty ridden people. Every leader out there should take personal aim to get rid of the poverty out of the world. It should start by providing fundamental education to each and every person of the world. This education also should focus on clean environment which would be good in long run. There are so many people out there who are poor and do not know how to get their next meal. On the other hand people waste so much of food. Leaders should device how to eradicate poverty at community level and then take it to country level.

Clean environment can help poor people in many ways such as prevention of diseases that can extremely affect malnourished. Air and water pollution can affect mal nourished poor people. So many contaminants in air along with particulate matter can cause respiratory diseases. SOx's, NOx's, Ozone, Particulates, Polycyclic Aromatic Hydrocarbons - PAH's are some of the air pollutants that has cause ill heath in humans. I have known poor people using firewood for cooking and they inhale Poly Aromatic Hydrocarbons directly into their system. After chronic exposure to these air borne chemicals they would be affected by Lung Cancer. I have known poor people working with asbestos and live inside rooms with asbestos roofs and inhale the harmful micro fibers of the asbestos which could lead them to a dreadful mesothelioma disease. I know for sure they do not have any knowledge of PAH's and asbestos fibers. People who sell them the asbestos should at least tell them it should be painted so small microfibers will not get into the air they breathe. Similarly I know lots of poor people who work in cotton mills. Chronic exposure to micro cotton fibers would affect the lungs. Awareness and knowledge should be

shared with them about the chemicals and safety measures should be taught to them. Occupational Safety measures are never followed in most countries that manufacture products. It may not cost much to the industries to do that. They should take care of the occupational safety measures for their employees. One example is people from firework industry die every year because of the lack of occupational safety. Apart from all the occupational and indoor air pollutants I have noticed that these poor people get into the habit of smoking tobacco. That is bigger predatory animal that hunts human health symbiotically along with indoor pollutants. Indoor pollutants, occupational chemical and tobacco smoking habit along with malnutrition make human body very weak. Immune systems of these people go awry. Biological pathogens using these favorable conditions pry upon such human bodies. Valuable human resource is lost and whole family is pushed back into non-recoverable poverty. Another major issue that I have noticed in poor laborers in every field is having a habit of consuming alcohol. Whenever I talk about alcohol, drugs and tobacco smoke, I feel they are number one enemies to the human kind.

I have thought and written about the damage the alcohol can do to the human resource and how it can devastate entire society, country and so on. Worst enemy that human race have is the alcohol. It starts with fun and slowly the person becomes so addictive to the alcohol and it does not stop until it kills the person. I think my previous sentence even may be wrong. It does not stop even after killing the person; it affects the offspring of these alcoholic persons also. Brain damage of these offspring makes them to do weird thinking and extreme actions. My aim is to create this awareness - chemicals such as alcohol are very bad to people and alleviate the poverty, here in Earth.

As an Environmental toxicologist, I studied about the damages that alcohol can do to the human body and I am always against any toxic substance affecting health. I am crying from my heart to see our young resources flocking into these liquor stores. See how this bad and evil industry has flourished in front of us.

Already we live in extremely polluted Area (AIR, WATER, SOIL and FOOD). Along with that alcohol and tobacco products will do a symbiotic effect on these people's health. How much one's heart, kidney and brain can take?

BRAIN, LIVER, STOMACH, HEART, KIDNEY and almost all organs are affected by alcohol. CANCER, High blood pressure, several deficiencies and diseases are caused by alcohol. So many articles on effects of alcohol and alcoholism are available.

Even though these many dangers exist - young people tend to drink more and more alcohol and are proud of that. Again due to the greediness of people, young people's lives are put into danger. During my last visit to southern states of India, I saw so many people flocking towards the liquor stores. Whole society is turning bad, we are losing youth to alcohol monster and it is going to haunt us for long. Human resources are going waste because of the alcohol consumption. We need to create awareness against evil alcohol killing our young resources at young age. We will move forward on creating awareness against this evil as much as we can in whatever way we can.

Poverty eradication should be done along with Sustainable Nature Friendly Development, education, awareness and occupational safety.

It is becoming norm and every year number of victims is increasing mainly because of their poverty level - Fire accident in a fire cracker unit has killed several poor working people. Why don't people learn from previous mistakes? What is the necessity of greed in making lots of money without caring for life of poor people? Safety Measures in this type of fire cracker industries is Zero. (I think when bought in bulk - gloves, masks would have been cheap and the owners could easily afford that).

Pollution Control Board, Environmental Inspectors, Occupational Health Inspectors and other authorities should inspect these places frequently. I think above mentioned

personnel are well educated and should do their part instead of getting bribe and keeping quiet if these industries violate the rules. Innocent poor workers are lost. It is sickening to see the families suffer because of some ignorant and greedy people.

Great leaders had great visions and were followed by many people all over the world, who became great leaders. Even scientists praised those leaders and followed them. Not only politicians and scientists followed and praised him, even the movie hero's were teaching well to the society that would eradicate the poverty from the face of mother Earth. Some of the good words were:

I should like to help everyone.

We all want to help one another.

Human beings are like that.

We want to live by each other's happiness, not misery.

We don't want to hate one another.

When a small group of people can do good projects such as Sustainable Land Development, think about how many good projects that can be implemented with the money, power, knowledge and team that the Government has. World Banks have approved millions to countries to implement projects that would eliminate poverty. Poor people should also have access to fundamental things. In one side of the globe - people have information on their tip of finger, where as other side of the world people do not have toilets. Equilibrium is missing here. I am not saying the rich nations should provide all to the poor nations instead they have to guide them to prosper. They need support as one would do it to a family member in need. That would eradicate the poverty. We can discuss so many aspects of poverty and environment, however it leads to nowhere. Only actions that are taken by leaders, countries, organizations and people would eradicate poverty and my point is that clean environment will aid

in that. However, I will give my two cents to eradicate and eliminate Poverty from this wonderful Planet.

Figure7: Poor people living in Nature sustainably



Recently on Gandhi Jayanthi I wrote in my blog:

October is month of Gandhi ji's birthday - One of his quotes - "Poverty is the worst form of violence."

He changed using rich clothes to the one he wore due to seeing the clothes that poor people wore. Also October 17th is the International Poverty Eradication Day. Even after all these years, Poverty is still a major problem in the Earth.

What can an individual do -

Give whatever you can to eradicate poverty. If you are educated - you can teach skills to people. Small deeds can together make it Big. Wherever you are, if you see a child begging or working (child labor), you should intervene; do the necessary thing to put the child in the School. It is easier to say than to do. However an effort should be taken. There are so many programs that are in favor of child upbringing in most parts of the World.

Education is one of main method that will eradicate poverty.

Sustainability is another method of eradicating poverty. If you can create sustainable projects that will benefit poor communities, utilize the human resources and give them back a share of profit - That will be a small step to eradicate poverty.

Environmental awareness and cleanliness along with sustainable agriculture can also be part of eradicating poverty. If you are successful in any field, you need to think differently and contribute some part of your success towards eradicating poverty.

High earning business people, movie personalities, professional sports people and politicians should mainly contribute towards eradicating poverty. Every other able person should also contribute to this common goal.

For my part - I am training people in areas I am educated. I have trained them in - Environmental Projects, Information Technology and Databases and get them better jobs. When they become successful, I have told them to contribute to others.

We have created EA Farms - Sustainable Natural Organic Agriculture Land Development project and helping the underprivileged in that area.

Even small things such as this helps - We collect US lucky penny dropped on ground and put it in a jar. Over period of time even it becomes a collection. When I go to India I convert into Indian rupees (1 cent = 60 paisa) and give it to an orphanage. That has helped them in getting them some daily needed materials. Small deeds can change life of other poor people.

Those who can read this - are fortunate to have a computer or a mobile device, internet and more. However there are other people who could not afford these luxuries and they don't even know how to get their next meal. So please think wisely about what you do especially if you are wasting something. Always keep those types of underprivileged people in mind and constantly think about upbringing them. Let us have a goal to eradicate

poverty and even if you can bring one person out of poverty it will be a great success.

"We must continue, with still greater speed, to change the lives of our people, especially the poorest of the poor" - Nelson Mandela. On this Gandhi Jayanthi day – I am praying for peace and non-violence.

Chapter 6

Factors affecting Environment



Humans – we think we can do whatever we want to do in the Earth.

We always implement projects by thinking it does not do any harm. We always learn it is wrong only after few years. Some world leaders did not care about environment. They misjudged the effect of environmental pollution. Humankind was into material world rather than preserving environment. To explain this in simple words I am going list various pollution sources in an alphabetic order:

A – Air pollution

If these pollutants such SO_x, NO_x, O₃, PAHs, Smog and particulates are added to the atmosphere in enormous level it would be very hard to breath. Air borne diseases will affect everyone. In future people have to wear air masks just to step out. We can list so many pollutants and without proper studies on human exposure, more and more minute particles are developed. Nano particles is future science, as much as it is helpful there is always a risk it will inhaled without knowing by humans. Small particles and its exposure such as cotton fibers, coal and asbestos particles has created havoc to human health. Already in some part of the Globe, people are wearing masks when they travel and people without masks inhale harmful air pollutants from the atmosphere. It is every country's duty to curb the air pollutants since it is a global problem rather than a local one.

B – Bombs and Biological Weapons

In this 21st century wars are happening in most part of the World. Some of parts are bombarded with bombs and some countries even threaten with chemical and biological weapons. All these would have severe damage to all environments and its inhabitants. Only solution to this all parties should think rationally, adjust with each other and come with a resolution instead of fighting irrationally. The negative aspects of war should be eradicated and positives from ceasing war should be used to improve environment and the inhabitants. That way we have better world for the future. So many good leaders have taught us that, but some ignorant people still want to destroy everything. Let us hope and pray that these wars, bombing and weapons will not be used in future for the safer environment.

C – Coastal Pollution

Coastal areas are main resource areas of every country in this planet. The amounts of people depending on such ecosystem are enormous. However, most of the recent studies indication abuse of these coastal environments all over the Globe. Sewage pollution, industrial effluents, agricultural runoffs, all point and non point pollutants affect coastal areas. Heavy metals, Organic Chemicals, and Nutrients change the coastal ecosystem composition entirely. They affect mangroves, sea animals from minute organism to biggest Whale in every part of Coast including estuaries. Estuaries are very important resource not only for countries and humans, but also very important for the organisms that thrive in these environment and it is really sad that it is degrading day by day. Water samples and studies indicate several coastal areas are pollutants soup and are not safe environment for any use. Proper management and educating people about the coastal areas, its inhabitants and meticulous use of these areas will help in survival of these important fragile areas for benefit of the World.

D – Deforestation

Deforestation is taking place in alarming rate. Human population is eroding these very important forest areas for their

use. This is done very carelessly without even considering the effects of deforestation. Pollutants are removed by forests. Introducing pollutants and deforestation will act symbiotically and degrade the Earth exponentially. Forests are sinks for the chemicals. When they are gone, we have to breathe and survive the chemical soups in all environments. Wildlife that depends upon the forests is feeling the stress of deforestation. Species are becoming extinct at very fast pace. Future generation can only see wildlife in pictures and videos. Humans deforesting is an abuse against these creatures. Eco-justice should be considered while people try to deforest. Forests should be saved and deforestation should be stopped for the benefit of every inhabitants of the Earth including the future generations to come. Otherwise they will live in concrete jungle and will not get the benefits of the forests as we did. Every Country should take immediate step against deforestation and save their valuable Forests.

E – eWastes and Endocrine Disruptors

Every day you hear the release of new electronic devices which includes phones, tablets, laptops, desktops and the list goes on and on. Once the new item comes people rush to buy these and most of the old devices end up in landfill. Think how much such devices end up in the landfill. Some them are even send to the developing countries where it is dismantled for reuse by child laborers without any proper equipments and safety procedures. There are harmful chemical including Mercury in the eWastes. What will happen to the child that is exposed such harmful conditions. We have to take strong precautions and device protocols to stop the exodus of e-waste or else we will not have landfills to dispose them. It is one of the biggest problems of the future. These chemicals along with pesticides, biphenyls, plastics and other chemicals (again list goes on and on) act as endocrine disruptors. Endocrine system is very important system in the body and if it is disturbed it can cause irreversible damage and have to take prescribed medicines for lifelong. It is time to do extensive studies

and come up with solution for eWastes and endocrine disruptors as soon as possible.

F – Fish Kills

It is very disgusting when you see thousands of fishes die and float in water bodies. Scientists scratch (including me) their head to find out what has caused this. It may be due to pollutants or unwanted biological growth which is caused by pollutants. These unwanted growths can deplete dissolved oxygen and also act as pathogens to kill the fishes. Fishing industry is an important industry in every country. So when enormous fish kills happen without knowing the cause it affects the entire fishing community and affects country's economy. I wanted to select fish kills for the letter 'F' because of my research. For my PhD thesis, I chose to study toxicity of two Chesapeake Bay tributaries. As an Environmental scientist with interest in water environments, I am always awed by Chesapeake Bay. It is one of the most beautiful environments in the World. Pocomoke River was one of the rivers I studied and the research, data and modeling predicted that it is one of most polluted in the Chesapeake area. After I defended my thesis in summer of 1996, a massive fish kill occurred in 1997 due to sudden increase of a harmful organism *Pfiesteria piscicida*. This sudden increase in the population of these organisms which produced and released toxins into fishes were due to pollution that occurred from both point and non point pollution sources. These organisms not only caused enormous fish kill, but also caused illness to the fishermen in the area. It is very important to study and manage both point and non-point pollutants and control them entering the water bodies. It should be a priority of Natural Resource Management.

G – Global Warming and Groundwater Depletion

Global warming is a very complex subject. There are both agreements and disagreements on the topic. We know that we are introducing several gaseous pollutions into the atmosphere. Some of these pollutants have been studied extensively and they indicate

heat energy is trapped by them. When temperature rises it modifies the various climatic conditions. Water level rises for sure and since there is always improper coastal management the low lying area damages are very extensive and expensive.

Ground water is being extensively used all over World and it is very hard to swallow that biggest aquifer in the world “Ogallala Aquifer” is almost depleted. Improper water management will lead to ultimate depletion of Ground Water. It is one of most important resource and must be properly managed. Extensive use of the ground water for agricultural purpose and polluting it with leaking underground storage tanks will affect the Underground water system. They are part of Hydrological cycle and if they are depleted entire cycle will be affected. It is absolute necessary to harvest rain water and replenish ground water everywhere. Proper management of green house gas emissions and Ground water usage will save the Globe.

H – Hazardous Wastes

Some of hazardous chemicals that are found in super fund sites:

ACENAPHTHENE, ALDRIN, BENZIDINE, CHLOROBENZENES, CHLORODIBENZOFURANS, CHLORODIBENZO-P-DIOXINS, CHLOROPROPANES, CHRYSENE, CUMENE, DDD, DDE, DDT, DDT, DIBROMOETHANE, DICHLOROETHANE, DIELDRIN, DIMEHTYLBENZENE, ENDOSULFAN, ENDRIN, HEXACHLOROBUTADIENE, LINDANE, METHOXYCHLOR, PHTHALATES, TETRACHLOROETHANE, TRINITROBENZENE, XYLENE and the list can go on and on. Just Google one of these chemical and see the effects of these chemicals, enormous toxicological data will be the search outcome. It would not be pleasant to read them, but it is the truth. Most of them are neurotoxins; carcinogenic and prolonged exposure can do sever damage to the organs, body and lead to death. At least in future before using these types of chemicals at will, a committee

including all different experts including environmental scientists need to approve using these chemicals.

I – Industrial Pollution

Industries are must in this millennium. Varieties of products are needed for this modern era and are manufactured in Industries. One of the negativity is that industries are pollution sources. Despite of advances in pollution treatment, still they contribute to significant amount of pollutants into the environment. There are so many industries such as pulp and paper, tanneries, utility, pharmaceutical; food, metal and lists can go on and on. Effluents, air pollutants and chemicals are let into environments such as water bodies. They not only affect ecosystem, but also are unaesthetic and is a sore to eye when you see a beautiful water body contaminated with pollutants. I had the privilege to work and give a solution to pulp and paper mill effluent in 1989. I was a young master’s degree student then and had somehow obtained permission to study and give a solution to remove the color from pulp and paper mill effluent which was let into the river causing dark brown color to the water body due to the excessive amount of lignin present in the effluent. As a young scientist I introduced electrodes into the effluent jar and coagulated the tannin and color producing ingredients. It was a magic – the color was removed and the sludge settled down. Instead of using electricity from fossil fuel sources, if solar power is used, it would still be a very viable method to remove color from the pulp and paper industry. That industry had other scientist working on the same issue with biological solution. The industry that let me do my research on its effluents was Seshasayee Paper and Boards Limited located in Pallipalayam, Erode, Tamilnadu, India. They were very efficient in processing and recycling the materials even at that time when pollution was not even much known topic in India. They promoted sugar cane bagasse as the raw material for producing pulp and paper. Sugar cane bagasse was a waste product from the farmers around the area after harvesting extensive sugar canes and extracting them for sugar.

During the process of pulp and paper, the extra steam was used to cook food for the industrial workers for very nominal price and the effluent after treatment was given to farmers for growing sugarcane. It was a very good model.

However, very small industries such tanneries did not have any treatment and the effluents were directly let into fertile lands. Humans were exposed to such harsh chemicals directly from the effluents. Hexavalent Chromium was used in the tanneries for preparing hide and it was one of the harmful ingredients in the tannery effluent. As an environmental scientist, it was hard to see the pollutions effect on environment, children and I have literally cried. Our team of young scientists provided good solutions for effluent treatment for various industries, but economy took over the environment during that time. Every environmental scientist should aim to find a suitable, viable cost effective pollution control which can be commercially implemented.

J – Junk Disposal

Each trash collection day I see increase in the amount of trash that is being disposed from every house. We have so many plastics, papers (especially from the junk mail), non working electronics, nonworking appliances, used couches and beds and another long list household junk material for disposal. These are never ending list and are for sure to grow unless proper action is taken by every individual. It should be a duty of every person to use all the materials up to its life and find a nearest recycle station to properly dispose these junk materials. If these junk materials are not categorized and disposed, it will end up in the landfill where it can cause chemicals to leach into water system especially the ground water. Junk reduction should start from every individual, household and up to country level. If proper measurements are not taken you would see these junks pile up and cause unaesthetic areas where disease transmitting rodents can survive. It is every citizen's response to reduce and recycle junk properly. The point is junk reduction should start from individuals.

K – Killing Animals

I want to emphasize Eco-justice. As we came to live our fragile life in the Earth, other co-living animals have come too. Since humans have the intelligence, capabilities and equipments, it does not have to be that we can kill all the animals at our will. Every year I see news about killing huge whales in enormous amount. Poaching is also increasing in many areas. Wonderful and majestic animals such as elephants, tigers and rhinos are killed at an alarming rate. Poachers benefit from the idea that of people's belief – every part of these animals is Aphrodisiac material, which is myth and not true according to scientific studies. Bears, Wolves and other animals are also killed in the name of control. Hunters have also killed majestic animals even luring from their protected environment. It is important eco-justice principle to let these animals live their life in their environment without disturbing them. Environment has the natural way to control these animals and human intervention can cause imbalance. Just few years back these animals were eradicated at a very fast pace. Due to certain people, steps have been taken to curtail the killing spree and these animals are making some revival. Humans need to follow eco-justice and allow these animals to live and share the Planet as every human wants to live.

L – Land Depletion

Land and particularly soil is an important resource for any country on Earth. As we know soil is an important resource for food production. Lately land has been abused so much they are becoming more and more sterile. Agriculture has been mechanized and chemicals are normal part of it. We are eating industrialized chemical induced foods. If a food sample is run through chromatography, I am sure at least trace amount of harmful organic chemicals can be observed. People steal soil from river beds for construction purposes in unlimited quantities - they completely destroy the environment. Buildings are constructed in fertile agricultural lands and if that goes on, there would be very minimal agricultural lands for food production. Top soil is also

very important not only to environment, but also for the economy of the country. If the top soil is depleted, quality food crops cannot be grown. It is again up to every individual to think about the fragile land and protect it for the future generations. If not the future generations will live in concrete jungle breathing high level of air pollutants, eating chemically grown unhealthy food and exposed to all kind of diseases. It is time to stop or reduce such kind of activities and protect our lands. Global warming, climatic changes, direct effluent runoff, point and non point source pollution and poor management also contribute to land depletion. Proper land management should be planned and meticulously implemented in all areas to protect the land environment.

M – Metal Pollution & Toxicity

We all know heavy metal such as Arsenic, Copper, Cadmium, Chromium, Lead, Mercury and Zinc can be harmful. We are fully depended on metals in manufacturing industries. Traces of metal taken chronically can also cause damages to humans. These metals usually affect the brain and extensive studies have been done on the neurotoxicity of heavy metals. Heavy metals also can leach into water bodies and bio-concentrate in fishes, which are consumed by many. They can affect the brain. We have seen and learned the metal toxicity - when children learning ability declined because of lead poisoning and even a dreadful disease called Minamoto disease caused by mercury poisoning. But still we are polluting the environment by releasing the heavy metals. Arsenic can cause havoc in communities. Every precautionary step is needed to curtail the unwanted metals entering into the environment to protect everyone from irreversible damage.

N – Noise Pollution, Nuclear Wastes,

Urban growth, population increase and vehicles have increased noise level. Yes, excessive noise is also pollution. Eight hours of hearing eighty decibels can cause severe damage to ears. Excessive noise causes several other health effects also. High blood pressure, disturbed sleep and finally hearing loss are some of the

effects of noise pollution. Noise pollution also affects wildlife. Sea creatures are also affected by noise pollution. Transportation and industries are the main source of noise pollution. Proper laws, implementation and education are needed for Noise Pollution reduction, if not; in future people have to wear ear muffs to save their hearing.

Nuclear energy is one way to produce power, the problem with this type energy production is the disposal of radioactive waste from spent rods. Most of the radioactive wastes originate from operation of nuclear power, research reactors and research laboratories. These radioactive wastes include solidified liquids, ion exchange resins, and filters. High level radioactive wastes are produced directly by the operation of a nuclear reactor and they are the most troublesome problem of the geological disposal. Locations for radioactive waste disposal should be chosen so as to avoid adverse environmental and human health impacts. Chernobyl disaster was a worst nuclear accident and still people in the area have long term health effects. It is very important to choose other power production methods such as solar power.

O – Ozone Depletion and Ozone Pollution

Ozone layer is helpful when it is present in the stratosphere and protect organisms from sun's damaging ultraviolet rays, however when it is present in the ground level it is a health hazard. Excessive use of Chloro Fluro Carbons (CFCs) contributed to the depletion of ozone layer in the stratosphere. CFC's were thought they were safe to use. Even though it did not affect the organisms it escaped to atmosphere especially to stratosphere where it reacted with ozone and depleted it. This Ozone layer is very protective layer and much needed one for all the Earth's inhabitants. Without this protective ozone layer in the stratosphere ultraviolet rays will directly come into the Earth and that is bad news. Ultraviolet rays' exposure can lead to melanoma and other health issues. Ozone depletion in stratosphere should be stopped and Ozone pollution must be contained in the ground level. Ground level Ozone is one of the ingredients in smog and

can cause deteriorating health effects to people who are exposed to them.

P – Pesticides and Petroleum

Pesticides and Petroleum are part of life. I can bet that whatever food we are eating contains trace amounts of pesticides. As the population grows we need to produce more and to produce more we use more pesticides, insecticides and other chemicals. The bad news is that the food absorbs these chemicals and more bad news the quantity increases (Bio-absorption, Bio-magnification) through the food chain. The worst news is that these are carcinogens and brain damagers. There are several toxicology studies done regarding Organophosphates and other chemicals involved in pesticides and they all indicate that prolonged exposure to them can cause irreversible damage to humans. Proper agricultural management practices needs to be done for reducing the pesticides in the food.

The other P – petroleum and its products are very much in need during this modern era we are passing through. We go regularly to gas stations and pump gas. Benzene and other volatile chemicals are present in the gas, which we are inhaling regularly. But that's the part of life. Benzene, Toluene, Polycyclic Aromatic Hydrocarbons and other ingredients are dangerous to human health. However we have no other choice. We are slowly exploring possibility of fuel cells, electric cars and tapping into solar energy. Until those become pollution free efficient methods, we have to live with using petroleum and its products.

Q – Quarries – Mountain top removal

When I see a resourceful mountain is cut such as cake or bread, I feel bad. Those mountains are majestic and play very important part in the ecosystems and its inhabitants. Essential Minerals erode from them, get into the soil, and then get into the food chain and gives humans the necessary minerals for survival. Instead to make money, the greedy people ignore to think about

the time it took for the mountains to form, their importance to the humans and ecosystem. They cut open the mountain tops; they cut mountain slices for granite and leave the opened mountain to become acid mine drainages. Environmentally friendly recycled products needs to be used for building roads, laws and regulations need to be put in place for removing mountain tops and very important mountain tops along with removing top soil and other soils from river beds. River bed soil is as important as the mountain. These greedy people do not care about the resources or about human health or about society, they are focused on the money they make and live a non useful life. Countries economy can fall if these resources are not maintained properly. Action should be taken and followed to protect the mountains, rivers and all the natural resources as much as one can. One must follow misery using these resources and enjoy what nature has to provide.

R – Radiation Disasters

Just hearing or reading about any disaster would bring chill to us. Think about Chernobyl disaster, Three Mile Island disaster, Tsunami triggered radiation disaster and people, ecosystem and inhabitants still experience the effect of these disasters. As we are more focused only on energy production, we ignore the effects and safety of people in case of emergency. A small operational accident or leakage can turn entire place into a radioactive area which can affect generations to come. We still do not have proper disposal methods for spent rod and spent fluids. We cannot pin point any area on the planet as a safe disposal area. Mutations, sterility and so many other effects are caused by radiation disasters. Hopefully we will use other renewable resources such as solar, wind and water efficiently and reduce the energy from radioactive materials. Further research has to be done regarding safety in case of building nuclear energy facilities. Severe environmental studies should be conducted for finding whether the land is suitable for such energy facilities.

S – Solid Wastes and Sewage

Mountains of solid wastes are dumped in the planet each and every day. It is even unaesthetic to see them as images in the web. If proper action is not taken immediately we will have to live with the solid waste along our side. They can cause unpleasant smells, diseases spread from these areas as rodents tend to live in these areas. Most of solid wastes are non-biodegradable materials and they can be in the environment for longer period of time. Solid waste accumulation can cause unwanted chemical leaching to the underground ground water. Already most of the world is drinking water from ground water source. These leached chemicals can enter into the body through the ground water drinking systems. Solid waste reduction starts from every individuals, I try my best to reduce the wastes as much as I can and request everyone to do so, so that the future generation can live like us and our previous generations, if not they will be living with Solid waste mountains and one could smell the unpleasant acid acrid smell miles away.

Sewage is becoming another major problem and many of the coastal waters are sewage toxic soups. Raw sewages are dumped in water bodies without even thinking about the damage they can cause. Water bodies contain unbelievable coli form counts and believe me, they are drinking water source for many. Sewage contains several harmful chemical substances and biological pathogens. So it is very important to manage proper disposal. Sewage treatment plants must be there near every village, town, and city and treat sewage influent. Treated water can be used as reclaimed water. Heavy metals such as zinc, copper, arsenic and lead has been found in sewage effluents and sludge and they contribute to the toxicity of the place where they are let out. Another problem that has not been studied in sewage is the pharmaceutical products that end up in them. There are no environmental regulations or generic treatment for them. Harmful bacteria may end up as antibiotic resistant bacteria as a result of pharmaceutical products in the sewage. Proper studies need to be conducted to prevent this and scientists have to work on proper

sewage disposal. If not we will be sailing, swimming and fishing in sewage contaminated water. Valuable coral and coastal lands will be lost due to this.

Figure8: Used Tires – Solid Wastes



T – Toxic Wastes

Toxic waste is a broad topic. Anything that is poisonous to humans, animals, plants and even micro-organisms can be considered as toxic wastes. It can be from a point source such as industries or a non-point source such as agriculture runoff. Once all these toxic wastes mixes in variable conditions such as climate, temperature, wind, sunlight, tides, composition of the area and the variables can go on and on. Such mixtures can contribute to eco toxicity and it can be very hard to find which is causing the toxicity. Scientists have to extensively work and find out the toxicity. I have worked on toxicity of sediments of Chesapeake Bay tributaries and contributed some findings to well being of that area. When I returned back after some years, I found out that the area has been improving environmentally. To know that was very satisfying for me. What an individual can do is properly dispose the toxic wastes, for example even used cooking oil can be very

dangerous to fragile aquatic organisms. So use precaution, know your treatment plants near your area and properly dispose them.

U – Underground Storage Tanks

Almost every corner of road intersections is having gas station and one can witness often they are remodeling or changing the look and feel of it. The gas is stored in underground storage tanks that are buried under the ground level. Over the years these tanks can leak and chemicals in the tank can leak into underground. As I discussed before ground water is becoming drinking water source all over the World. If underground storage tanks pollute this groundwater drinking source directly, it is going to be a major problem. Major steps and research needs to be done in this area to stop the leachates and even if it leaches, the plume should be contained in an environment that does not affect the groundwater area. Even still if it contaminates the groundwater, the water should be treated efficiently before it is circulated as drinking water. This would save many lives, however environment may be still contaminated with the hazardous chemicals. Proper maintenance, laws and regulation should be done considering all these aspects of underground storage tank pollution.

V – Vehicle pollution

Day by day you can notice increase of vehicles in the road. Cars, trucks in the road, airplanes, jets in the air and ships, boats in the water - contribute pollutants into the environment. When the amounts of these pollutants increase it is going to cause lots of effects in the environment. Sulfur oxides, Nitrous Oxides and particulate matters are let into the environment. They can cause havoc in the environment. Cities experience smog, people have to breath dust, soot and in long run can cause health problems. Already in some of the cities, people are wearing masks when they venture out. If proper action is not taken climates will change, acid rains will pour which will change the composition of present state of the Earth. Let us start to do something individually such as

sharing rides, using public transport as much as one can to slow down the vehicle pollution.

W – Water Pollution

Water is an important resource for all the lives to sustain in this Earth and it is a very important chemical compound. I am always fascinated towards water as an Environmental Scientist. I am fascinated towards Lakes, Rivers, Waterfalls, Ponds, Streams and Oceans. If water resources are depleted or water management is not properly done, it will affect individuals, countries and even the whole Globe. However humans take water for granted, use it unwisely, pollute and contaminant as much as they can. Water bodies are polluted from both point and nonpoint pollution sources. Water is affected by industrial effluents, sewage pollution, runoffs, atmospheric pollutant input and also biologically by pathogen contamination from various sources. If we continuously deplete water resources and simultaneously pollute the remaining water bodies it will be disastrous to the Planet and its inhabitants. Already drinking water is costing us money and if we do not manage water, we are looking towards rationing water in future, which is not right at all. Proper actions are needed against water pollution and proper management is needed to protect our water bodies.

X – X-ray and Medical Wastes

Now a day, you go into a hospital for some small illness, you are required to take X-rays. Every x-ray taken after a while, end up somewhere in the environment along with other type of medical wastes. I have read even dead fetus was found in medical waste that was shipped to some other part of the World. Improper medical waste disposal can cause lots of damages especially to health of the people exposed. To overcome these problems medical wastes should be properly handled, sterilized and treated properly before disposing in the environment. Also unused over the counter pharmaceutical products are improperly disposed and can end up in the water bodies. People can be drinking medicine soup

unknowingly because they are not removed on most of the existing treatment plants. In future, water treatment should check this medicine's presence and consider special treatments for these medicines in the water. This can create a major environmental problem if proper steps are not taken immediately.

Y – Yard Wastes

Every household is generating organic yard wastes. These yard wastes should be properly handled and discarded. Piling yard waste can create other issues such as unwanted organisms including microorganisms that can shelter can cause issues. It is therefore very important for properly disposing yard waste. Sometimes yard wastes are burnt which is more serious problem especially on human health. Leaf and organic matter burning can cause severe issues on people with respiratory health issues. It can also emit carbon monoxide is a very dangerous gas that can even cause death. Also yard wastes can be properly turned into composite materials and turned into advantage material rather than a polluting material.

Z – Zinc Mining – Acid Water Drainage

Finally, we can come into Z of the pollution. Humans have been mining for metals for years. Zinc is being mined in most of the countries in the World, even in the remote areas. When the mining is done, the open area left out is filled with water. The metals may be leached in high levels and make highly dangerous water. Recently even Environmental Protection Agency misjudged these amounts of pollutants and opened a mine into water bodies causing a major pollution issue. So it is important to carefully deal with mine drainages, since estimating the levels and disposing can fool even the environmental experts. These mine waters are also acidic and can cause havoc (both flora and fauna) in the environment where they disposed.

You can also search the internet on each topic (A-Z Pollution) and get more information. However these pollutants can be

reduced and removed safely with carefulness. Small mistakes made can make the pollution irreversible for many years. Whatever I discussed is just a small part of problems we are causing to the environment and to our Earth. So it is very important to take necessary steps to reduce if not stop polluting and protect the environment.

Chapter 7



Economy and Environment

eco vs ECO - Title implies that lower case eco is for environmental and

UPPER CASE ECO for ECONOMICS. May be one day we can change that.

As our aim is to use natural resources, we tried to bring in the solar and wind power to EA Farms. However initial queries for these ended up with huge cost estimates. We contacted a company that produces water from wind. Their technology is good, but the quote for the system was above our limits. Then we contacted another company for solar and wind energy Combo unit. This cost was also high.

Our power requirement will be minimum and hence we are planning to go with regular power resources (which we have several issues also :-)) rather than SOLAR & WIND Energy for time being.

As always Economics take over precedence over Environment.

But we will not give up. EA Farms will conform to minimal usage of power and try use renewable resource as we move forward.

In an earlier post I had said about eco Vs ECO (eco represented environment and ECO represented ECONOMICS) and always the later won. Also was hoping that one day that tables would turn. I did not think it would turn that way this soon.

Now it is ECO vs eco - here ECO is environment and eco - is economic. This time Environment is saved:

Environment authorities of India rejected proposals to mine the mountain (Billions of \$s), which would have affected the tribes.

The government has also stopped a \$12-billion steel plant proposed by South Korea's POSCO in Orissa. Just saw a program on how industries (especially foreign industries) are built by covering dried water bodies. Even though these industrial programs have programs towards greening the environment, they have done everything against environment in building these industries in Sriperumbudur, India.

Another earlier blog:

Eco Vs Eco

One future environmental engineer asked me the following question regarding the above blog post:

Hello Dr. Makesh,

Considering your opinion on the Environment Ministry's decision on disallowing Vedanta from mining bauxite in Orissa I have a doubt. Where do you think should we draw a line between environmental importance and economic importance? Since I am new to this field I am still confused what viewpoint to take! I have an opinion that in the name of environmental protection we should not be a barrier to development (in this case bauxite is very important for us too).

Please correct me if I am wrong...

And, my classes have started and I have taken up courses on Solid/hazardous waste management, Chemical Principles of Environmental Design, Environmental Regulations and Policies.

My answer to it:

Thank you for the email. What I am talking about is the greed. We don't have enough forest resources in India. Already

deforestation is taking a toll. We need some forest lands to be saved.

I know we need bauxite. If we allow them to take the bauxite, do you think our greedy people will stop mining bauxite in limited quantity? NO. They will wipe out the whole area. They will remove the whole hill top, which will affect the environment (soil, land, water, ground water) and affect the climate. These environmental effects also have an economic cost and will easily outnumber the cost earned by mining.

I am also for economic growth, however it should be sustainable. If they remove hill top and mine, what are the plans to replenish it?

Why India has most tanneries than any other countries? Is there any tannery or similar industries in Developed nations? No. Because we just let the effluents directly to the land and do not care about the environment and people (hexavalent chromium is dangerous to people - it affects brain).

Recently I read Indians have the most Swiss bank accounts (more than 1trillion \$). If they just spent few percent of that, it will be a most developed nation. Because of greed of money and not caring for our environment, lots of foreign industries are coming into India (on the basis of economic development) and polluting India. We don't have any standards and we do not implement them. Cell phone companies, car companies, etc (long lists) are flocking there. In this case POSCO - a Korea based company is showing interest in our mountains. They have beautiful mountains. Will they remove their hill top? NEVER. What we need to do is - ask them to take care of our environment too. That is what we are lacking. Day by day agricultural lands, forest lands are taken away by industries. It is also becoming dumping ground (I have written so many articles about it). Environmental Pollution will cause more economic damage than what industrial growth economy produces.

Good that you are taking up Solid/hazardous management courses. Regarding Solid waste management - you have to think that prevention is the best option rather than management. But that is not going to happen in the near future. We have to take slow steps. If we don't act now India will lose its natural resources at very fast pace and living conditions will become worst. I hope you got my point. We need economic growth but in a sustainable way.

Please concentrate on Environmental Regulations and Policies courses. By studying such courses, young people like you can devise policies to make sure industries have environmental sustainability plans to save the environment that they are destroying. We can bring new industries to make our economy improve, but we need proper regulations and policies in place for that and take care of our great environment.

In this case we not only saved environment, but also indigenous people (who lived there for centuries).

I have traveled to many countries and see the differences (how they protect their environment and how proud they are about it).

If you carefully account for the environmental cost of the environmental deterioration over the years, the development benefits by mining will be negligibly small. (That is what big companies do - give hard blue collar jobs to our people in the name of economy, destroy our resources and leave the mess for us to clean).

His answer back:

Dr.Makesh that was such an interesting mail! I have so much to learn from you. I had to read the mail thrice just to comprehend the depth of certain things. You are so very true about so many things, for example, the companies exploiting us and leaving up a mess for us to clean.

I'll surely take up Regulations and Policies seriously.

Figure9. Going Green



Hopefully I made a person to take this Environmental Regulations and Policies seriously and help saving our land and environment. These industries who advertise that they are going GREEN, should actually take steps to GO GREEN (even if it is a growing nation where they create their branch).

Chapter 8



Greediness

Every day we hear about aggressive mining of Granite for making millions. Greedy irresponsible people who don't care about future of the country make huge mountain disappear. Mountains are there for a reason. They are very important resources for the country. They provide minerals to the ecosystem. By mining aggressively along with cutting numerous trees, these people for sure, will turn the nation into a desert. In doing so, they affect the health of poor people who work there. Mining causes to release dust and radon gas that are inhaled by poor workers which affects their lungs that leads to lung cancer. Mining also can cause voids, affecting balances in rocks that lead to seismic waves which induce earth quakes. Environment and Health deteriorates because of such mining practices. With all that money, they and their future generations will be only enjoying the Desert Environment in the future. Rocks are very important for soil formation. Also it is equally worse to remove sand and soil from river beds. I see pictures of huge machines removing loads of very important soil resources from the river. This will not only affect the environment but also affect the country's economy. These people think they can make more money by mining to last soil particle, but what they ignore is the future of the country and its people. Hey illegal mining People - STOP illegal mining and soil removal immediately, at least for the sake of your own grand children, if not for the great country.

Good thing that these huge Granite Mountains are out of your reach :-).

Figure10. Yosemite - Half Dome - A Granite Dome



You should read how these wonderful granite mountains have been saved and secured as - National Parks.

All we see and hear is that granites are mined beyond limits, River soils and sands are removed at unprecedented levels, Trees and forest are destructed at alarming rates. Human resources are depleted by government supplies of liquor. Corruption everywhere as that of 2G SCAMS.

OH MY GOD: Once again stop all the above negatives including - STOP AGGRESSIVE MINING for GRANITE and SAND REMOVAL FROM RIVER BEDS. If not it is going to affect you and your future generations also.

Figure11. Wonderful Palani Hills



Figure12. Beautiful Western Ghats Mountains

HELP to preserve the WORLD HERITAGE SITE - The great WESTERN GHATS.

Chapter 9



Carelessness

If you notice my chapter topics are very simple and not much complicated in this book - Modern Environmentalism. The main aim of modern environmentalism preaching is to be greedless and sustainable. I feel carelessness contribute to non sustainability, and hence included this simple but important topic towards sustainability. I have seen people throwing plastic wraps, cigarette butts, and garbage all over the places without giving respect to the place, environment and Earth. Even though there are garbage cans in place, people ignore them; this is what I mean by carelessness.

Plastic bags ignorantly thrown in the environment had ended up in organism's stomach not only in Land environment but in Ocean environment also. There are garbage islands in our oceans which will not disintegrate for centuries. These not so easy non biodegradable materials stay very long periods and we still do not know what effects they are going to contribute to the deterioration of the environment. I have seen places where these materials strewn across the entire areas spoiling plants and trees. It is very unaesthetic to eye and also create health hazard. All these negativities are because of some people, who are very careless.

Careless should be eradicated from childhood. Proper response should be taught from childhood. It is a simple teaching to a child that Environment is important and garbage should not be strewn or thrown anywhere, it should be properly disposed. Each child should be taught reduce using of materials, do not waste, only use what you need, reuse as much as you can and properly dispose. They also need to be taught of recycling. This way it will be very useful for future generations. They will not carelessly throw the waste materials in the environment.

It is not only children that needs to be taught, every individual, organization, industries and government should not be careless. They need to take care of the environmental issues. They need to budget not only their monetary spending, but also their resources usage. There are so many benefits to it. Non renewable resources must be used as stringently and carefully as possible. We have already made mistake of being careless in the environment pollutant problems and are facing the problems.

Some of the pollutants are not local problem anymore. Countries can't be careless and polluting the atmosphere, since it is a Global problem. Air pollutants have increased in such a way that they are affecting climates. Climate problems can cause deteriorating effects not only in poor developing countries, but also developed nations. We are still not ready for such devastations. So it is better not be careless and take responsible actions to prevent these effects.

Figure13. Garbage Strewn across railroad



It should start from every individual. People should plan everything such as taking one trip to finish various errands rather than taking multiple trips by carelessly not planning. These small methods contribute to the wellness of environment by reducing the pollution. If one such action can reduce the pollution, think about small towns, cities, states and countries taking such actions, it will reduce enormous amount of pollutants and pollution. Who

is going to benefit from this – all the inhabitants of the Earth. By reducing the air pollutants and stopping climate changing we are going to help our brothers and sisters who live in coastal areas of Earth. Recently we came to know that big, rich and reputed car maker Volkswagen manipulated its emission test. This is what I call careless and greediness.

By stopping throwing plastic bags and unwanted plastic materials in the environment, we can save useful fauna and flora of the Earth. Just by being careful and not being careless we can really protect our environment. So next time when we have an opportunity to dispose something please do not be careless and be careful in disposing things properly.

Chapter 10



Lawlessness

News about the Fire in an industry:

A fire broke out at an external material storage area of a company situated in the Nokia special economic zone near Sriperumbudur. Fire spread because of inflammable chemicals kept in the storage area. Fire spread because of the 3,000 liters of paint and 47 tonnes of varnish were kept at the storage area. Black smoke spread to about 200 meters, causing irritation of eyes.

No one was injured from the industrial fire – that is good news. However the fire burnt inflammable paints, other chemicals and sent smokes all over. This should have caused some damage to the air quality. Lots of people are living around that area and lots of agricultural lands are there near that area (Recently visited that place). Severe Environmental Damage would occur due to this. Tamilnadu Pollution Control Board should assess this damage.

People from Finland were worried about the job loss when Perlos moved the jobs to a developing country.

Perlos Job loss in Finland:

Finnish company Perlos, which makes mobile phone casings for Nokia, would end production with the loss of 1,132 jobs which would be moved to a developing country, as part of a bid to return to profitability.

However it is only jobs they lost, Think about the Environmental Damage this fire has caused. The Environmental hazard that has happened to Environment and air quality of Tamilnadu is more damaging than just losing few jobs. This area is an agricultural area and this would not only damage crops but also

affect the health of the people. Hazardous air pollutants will be inhaled by people living in those areas. Only years of real scientific study will identify the real damage.

Read my earlier chapter 7 (Economics Vs Environment) about conversation between me and a graduate student regarding fine line between environment and economic importance:

Environment and Economics

Even though Finland was worried about Perlos Job loss, people are safe and have better environment, whereas People of Tamilnadu might have got some blue collar jobs (Not the white collar jobs - may be few) from this industry being moved here, but face severe Environmental damage including Health effects from this chemical fire.

Finland Environment is getting better says Environmental Protection Finland. It further stated that the fruits of successful environmental policies are clearly visible around the country. Many polluted lakes and rivers have been cleaned up. Air quality has improved greatly around industrial locations. An extensive network of protected areas has been built up to safeguard biodiversity. Forests – Finland's most valuable natural resources – are managed more sensitively than in the past.

Finland Emissions. SO_x, NO_x, NMVOC, CO, PM - all air pollutants reduced over the years. As an Environmental Scientist, I bet 100% that all these chemicals must have increased at damaging levels in the atmosphere because of this fire in Tamilnadu. Even though it is an accident, what emergency remediation action plan we have? or what rules India have regarding this (Environmental Pollution)? Or who will be responsible for cleanup and health problems from this industrial fire?

We still did not learn from Bhopal tragedy. Our Politicians have other priorities – Bringing more and more such industries without proper Environmental planning or litigation.

Figure14. Magna Carta – Freedom under law**Industries Flocking into Tamilnadu:**

As more and more industries are started, the government must consider and do stricter Pollution Control also.

Tire manufacturing Industry is coming to Gangaikondan, Tirunelveli in near future.

Commercial Vehicles Manufacturing Industry and Nokia spare parts manufacturing coming to Orakadam, Chennai

Cuddalore - Petroleum Refinery & Ship building Industry,

ThiruChopuram - Building Harbor for private sector along with several other industries.

These industries are good for the Economic development of the state.

However the environment in above industrial areas: include ISLANDS, CORAL REEFS, MANGROVE FORESTS, WETLANDS, and FORESTS, which are as important as the Economic development and are very sensitive. Also these industries should consider effects of their outlet on HUMAN HEALTH.

Cuddalore, for example is already a polluted and environmentally sensitive area. It has been affected by Tsunami. Mangrove forests have been helping the coastal areas from fierce force of cyclones. So, Mangrove forests are needed to protect the coastal areas.

Even though these industries are vital for economic uplift, these industries must consider Environmental issues (Mandatory) also. To make it mandatory we need law. This law should make people to action freely under the law against the violators.

We should be happy and thank God, that there was no mortality in this industrial fire. However, we should wake up now (this is just a warning alarm) and create Proper Environmental Litigation and Environmental Responsibility by these industries. Without proper laws it can (will) become SUPER FUND sites.

Chapter 11

Sustainability

Sustainability in simple words is - to be satisfied with what you have equaled to what you need for basic necessity. It may differ from person to person, but you should know the limit. Anything above the limit is not sustainability.

Figure15. Sustainable Growth



Eradicate Greed:

Sustainability will be success when each individual stops being greed. Once there is no greed, every evil step stops. For example if a farmer stops spraying more pesticides for greed of more yield it will indirectly stop the chemicals entering the food chain and making the crop producing land more sterile. Greed acts a blocker of sustainable development. Greed leads to other negatives such as war. So the first step is to curb greed. Whenever you are in a position to take decision think about a point where you yourself consider that as Greed and make that point to turn as a sustainable one.

Have a Future Vision:

After curbing Greed, take the next step by thinking about future. Whenever you start a project do not view only current needs, always plan how you can expand it in the future sustainably. I would use the same example as before, instead of using more pesticides and chemicals on the farm, use organic manure and natural products so that lands stay fertile even in the future. Also when we started EA Farms – Sustainable Organic Natural Agricultural project we designed in such way, thinking about the future. It has grown as we envisioned. We are adding new items every day for the growth of the project in a sustainable way. Without greed growing in sustainable way is the future. Have that future vision for any project.

Clean Environment:

You can be even in poor environment, but keeping the environment clean is the key. Many diseases are associated with environmental pollutants (Note it can be chemical and as well as biological). So it is necessary to maintain the clean environment. In this era - ask your government (local, national or even international) to do the necessary for the clean environment. These government bodies should do the basic necessity of keeping the environment clean. The cost involve in keeping the clean

environment is comparably low than the cost spending on negativities caused by polluted environments. Even in the 21st century public defecation is still there, and every individual and government should take necessary steps to eradicate that and provide basic human necessities.

Always Think Positive and Contribute:

Whenever you start an environmental project or any project you may face lots of hurdles. Never give up in your ambitions. Leaders and people who have given us good life have been through lots of tough periods. They always thought that they can complete their work and can achieve their goals without any selfishness. They were always positive whenever they faced negatives and odds. So if you think positive and contribute to your projects your goals also can be achieved. Just take small steps and add to it daily small steps. One day you will notice you have come a long way. You will feel the positivity about what you have done so far. It is always great feeling if you contribute positively and sustainably. So never give upon the positive thinking and successful contribution wherever you are.

Hard Work Ethics:

Once you stop greed, think about future, have a clean environment, think positively and contribute towards a project put in your hard work. Nothing will stop you when you put in hard work towards your projects and sustainable goals. You may not succeed in certain methods, but every failure contributes to success. Failure should be taken as stepping stone to success and hurdles should be turned into opportunities. You learn from the mistakes and move on. One day you will notice only success, failures will be long gone. Your projects will speak for it. In case of failure of some of the steps, the nature has taught us to be adaptable so you can sustain in the future by following wisely on nature's advice. So work hard sustainably to achieve your goals.

Be Truthful:

I consider being truthful is part of sustainable growth. If you speak truth you don't have to remember everything you said. By taking farming as an example I can explain this also. Some crops may fail even in favorable conditions, so it is better to say this crop failed than to lie to the other farmers that you had very good yield, which will lead to wrong following and create a huge loss for many more. It is very important to be truthful even in the case of failure, which will help to correct yourself in the future. Some greedy people have guided farmers in a false path such as emu rearing and other failure projects. Farmers also should not follow these liars blindly and they need to research properly before they start these projects. Also government should have strict laws and protect the farmers from such cheaters. Being truthful is very important in Sustainable Development.

Create Awareness:

You should create awareness especially whether you succeed or you did not in your projects. That will help other to be cautious in their projects. Thus awareness can also be an important part of the sustainable development and projects. You should not only publish the success stories you should create awareness what went wrong in your development or projects, so others following on those projects will take a precautionary steps by ignoring the negatives. You should take awareness to all level of people. These days even children are exposed to lots of data. They should be guided by the positive awareness on any topic. I have done research on carbon monoxide and tar poisoning. What is one of the sources that contribute to it – Cigarette Smoking? So it is not heroic if you smoke, it is going to spoil your health – This type of awareness needs to reach children. If you are smoker, just do small experiment – Take a small square of white cloth and blow the cigarette smoke on to it. Observe the color change and same way your internal organs especially lung is going to change. So think wisely and do not use these types of wrong things. Similar

things apply to alcohol and drugs. This awareness is must in every field and will guide youngsters accordingly.

Educate People:

Education is must for sustainable development. Still lots of children do not get education. It is our duty to educate every child. Education changes lots of things; it is very important part of eradicating poverty. Once poverty is eradicated other things become easy. If you are expert in an area teach them to as many people who are in need of that expertise. It will bring them up. For example I have taught many people on my expertise – Environmental topics and Information Technology techniques. Those who have got training have grown up in their status. I have asked them to provide the same thing I gave to them to as many people as they can. This will up bring a whole society of educated and trained people. So, education is an important part of sustainable development. Each and every government should provide proper education to its children so the whole Earth improves its status. However, if you are educated do your part apart from depending only on government.

Live Harmoniously:

We have discussed many topics in this chapter, but one topic – last but not least - to include in sustainable development is to practice living harmoniously. Every step will be a waste if we cannot live harmoniously. There are so many human made factors that pose serious threat to this topic. But developing tolerance and take humanely decisions will help in improving living harmoniously. Every human being needs to solve their problems in a humane manner instead of taking the negative route which will solve the issue, but make it an uncontrollable big problem. Great leaders have guided us in this topic and just following them will take us to this wonderful path. While working towards eradicating poverty once should try to eradicate hate, discrimination and racisms. These should have place in this Earth. We should practice tolerance and live harmoniously. All

these will help in sustainable development and create wonderful sustainable society on the face of the Earth.

Chapter 12



Solutions for Environmental Problems

Refuse, Reduce, Reuse, Recycle, Recover and Dispose are the steps that needs to be taken and will help Environment for long period. I am going to use the cell phone (latest gadget and almost everyone on the Earth has it). Technologically it is a great product and on this information age it is important to have one. However each day a newer version comes and new device bought yesterday becomes old immediately. That's the reason I am using cell phone as an example for this chapter. If we don't take proper actions soon enough soon landfills will be filled with ever growing old cell phones and create havoc on the environment. When the cell phones become obsolete, they end up as solid e-waste. Cell phones contain hazardous materials such as Brominated flame retardants (BFRs), Poly Vinyl Chlorides (PVCs), along with traces of Lead, Cadmium, Beryllium, Arsenic, Antimony and Mercury. Because of these chemicals it is very important to properly use and discard them into the environment.

Refuse:

I have seen people carrying more than one cell phone just for the sake of it. Everyone wants to have the latest version of the cell phone even when what they own works perfectly. It is necessary to take decision and refuse to use more than one cell phone. Make sure to use one phone for all the needs instead of separate phones for office and personal use. If thousands of people refuse to use multiple phones and use single phone for their use, that itself makes a very big difference. This can reduce significant amount of e-waste entering into the environment because of the cell phones. Refuse – not only works in this case, but also in many

other materials. Unless if you need something for sure, refuse that material. Refusing is significant solution to Environmental Problems.

Reduce:

Reducing the necessity for multiple cell phones also decreases the number of phones ending up in the environment. Prolonging the cell phones usage as much as one can and it will contribute significantly towards reduction of e-waste. Instead of going for latest version, use your phone until it can't be used no more. Any material reduction is also a significant solution to Environmental Problems.

Reuse:

There may be people who want your phone that you think that is obsolete. So it is wise to contribute to them rather than dispose it. Clean up and format to its original company settings, erase all you information and donate it to someone who is in need of such phones. Reuse can be done for any material or gadgets. There are always experts who can make it to work even if it does not work. Contributing or donate them will make the gadget to be reused. Reusing is important factor that is a significant solution to Environmental Problems.

Recycle:

Gadgets, equipment or electronic devices are made up several components. Even though the whole unit may not work, there will be some part that can be recycled. Now a day's these nonworking parts can be recycled efficiently. So it is necessary in your part to take cell phone or any other such gadgets to nearby recycling station and give it instead of disposing it in garbage. Also, since it contains hazardous materials it is important that these materials should be handled and recycled safely.

Figure16. Converting waste materials into Eco bags



Recycling has been there for long time and should be done with more efficiency in future. Recycling always will be one of important and main aspects of curbing environmental pollution.

Recover:

Before disposing the used cell phone and throwing it as a waste, one should properly give it to people, who do recover parts from it to be reused. There are methods and companies that at least recover materials from the old cell phones which can be used instead of ending in a landfill. The plastics can be remolded, metals can be recovered and used in other process. Recover is also an important part of significant solution to Environmental Problems.

Dispose:

Finally after considering all the aspects of solving the Environmental Problems – Refuse, Reduce, Reuse, Recycle and Recover, the remaining materials should be properly disposed. Landfills have improved a lot in curbing leachates. So final leftovers of the cell phone should be disposed in such way the hazardous trace metals do not end up in ground water or other water bodies. There are new technologies where they can bio augment and degrade the toughest materials. Incineration should not be considered in cell phone disposal, since lots of toxic materials are there and burning would cause them to enter atmosphere and end up as air pollutants. Proper disposal plays a significant solution to Environmental Problems.

In each topic discussed in this chapter - Refuse, Reduce, Reuse, Recycle, Recover and Dispose, I have added a sentence saying that these are important and significant solution to Environmental Problems. I did because they are important steps and emphasize these topics as much as I can. So please follow these steps before blindly throwing stuff into environment. It may be a small material, but think these steps before it ends as such in environment. So **Refuse, Reduce, Reuse, Recycle, Recover** and **Dispose** properly.

Chapter 13



Environmental Awareness

Any concept reaches people, only when awareness is created. There are people who do not believe in pollutants induced climate change. Climate is a natural process for sure. However pollutants let into the environment slowly for years have acted exponentially and contributed to climate change pattern. Experiments have proven that ozone hole (due to human made chloro fluoro carbons) and green house gases are for real. These have caused climate change patterns and are disturbing the ice in North Pole and melting them at an alarming rate. It is always threat to coastal areas.

Taking about coastal areas, many of them have become toxic and pollutant (both chemical and biological) soup. If the pollutants are not contained, it will be hazardous to swim in the coastal areas and in beaches. Erosion and water with chemical contaminants will not be aesthetically and health wise good.

Taking about health, I want to write more about Environmental health

Air Pollution – more and more cities in the World are contaminated severely by air pollutants. Smog, Sulfur Oxides, Nitrous Oxides, Particulates, Polycyclic Aromatic Hydrocarbons and Ozone are some of the air pollutants. As I have said before, If we don't take action soon we will have to wear masks in future to survive the air pollutants. Air pollutants are also main causes of dreadful diseases such as lung cancer, asthma and other respiratory illness. Air pollution is also a Global problem, it not only affects the local area, but it is dispersed, circulated around the whole Globe.

Water Pollution – most of the water bodies are already polluted at high levels. Biological pathogens are found in alarming rate in the water bodies in some countries. Chemical pollutants are also present in every water body including places that were thought to be pristine areas. Aquifers, Bays and any other water bodies can be analyzed and one can find pollutants in them. There are so many point and non point sources that affect water bodies. We have come to point that we cannot make these water bodies completely devoid of pollutants. However we should try to reduce them.

Figure17. Protecting and Restoring our Water Resources



Land and soil pollution – We have abused the land and used them more than anything. Humans have mined, deforested, built enormous number of buildings, roadways and also farmed using chemicals and machines. All kinds of pollutants are let into land and soil. We have mined mountains into moles and removed important fertile top soil from river beds. These activities have been done with unbelievable greed. It has come to a point that it cannot be reversed. Every resource has been utilized improperly without thinking of consequences. Deforestation is happening at an alarming rate.

Talking about deforestation brings the topic of eco-justice. Humans take it granted as if Earth is only for them to in habitat. There are other flora and fauna which I think have equal right to in habitat. However forests are destroyed for the benefits of humans to build buildings and cities. Where would these animals go for living? The boundaries between cities and forests are thinning at very fast rate. Humans and animals face off each other very dangerously. This should be worked out as soon as possible and the other organisms should be considered with proper justice to them.

These are some of the basic topics that should be taken to the people and create the knowledge of impacts of pollutants. So they know what the hazards are and what the implications of pollutants to the environment are. We cannot reverse what has been done, but at least the environmental awareness we create will reduce the future flow of pollutants and that is aim of Modern Environmentalism.

Figure18. Save the Bay



Another environmental awareness is to share the knowledge of how to react in case of toxic chemical accidents. It could save

enormous amount of lives. Sometimes even a simple method such as wet cloth put against nose will stop hazardous air pollutants entering the body. This knowledge, environmental awareness could save lives. Also campaigning for the environment also helps in protecting the environment.

Figure19. Vote Yes on 1



Real Environmentalism

What I mean by real environmentalism in the modern era is that we have come to a point that we cannot live without pollutants. If we talk of about zero pollution, it will seem like we are joking and people would be mocking on us. In modern real environmentalism, we have to create awareness, teach passion towards environment and reduce the amount of pollution and recover the affected areas as much as possible.

Chapter 14



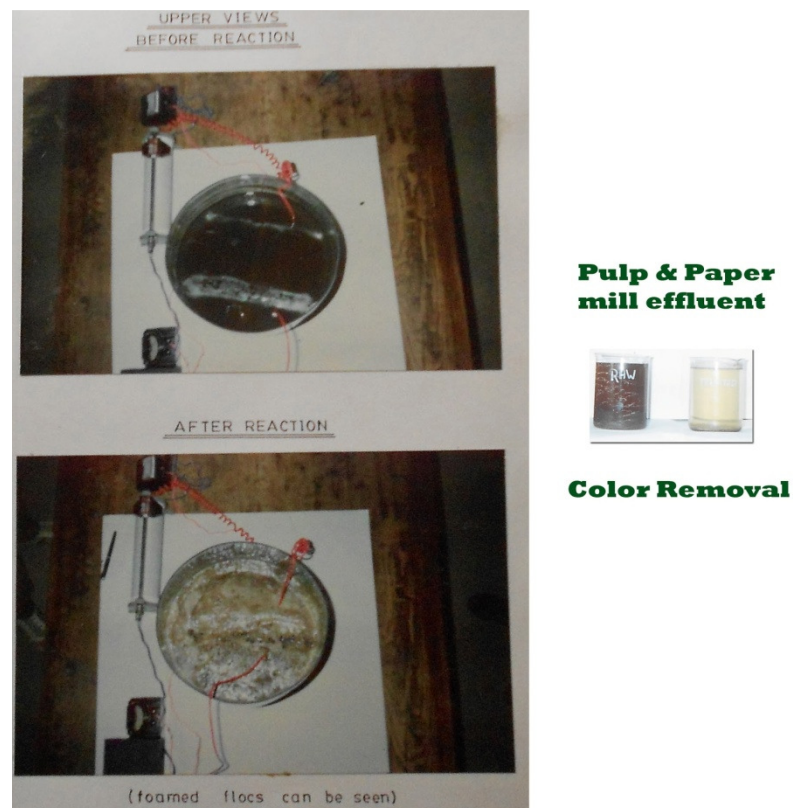
Environmental Passion

Any job you do with passion becomes success. Sometimes you may be doing certain other jobs instead of your passionate job. However when the focus is there you will find a way to achieve your passionate job. Everyone should have passion for the environment. That way we will become aware and will not pollute and at least curtain our damage to the Earth. Simple things such as just stopping flowing water while you are shaving can save some water. Those who have enough water usually do not care about these things. However when you think of people who walk miles to fetch some potable water, you will automatically create an awareness in your mind for saving water. Once you feel the goodness that you have saved water, it will become a passion. You would want to do more for the environment.

After saving the water, if you are planting a tree and feeding it using the water you saved, it will become a more positive action and is also a true passion towards environment. When the tree grows you could see birds coming to the trees and if it is a fruiting tree, you will benefit from the tree. Such type of simple actions can create big impact on the positive side for the environment. I always had passion for environment from childhood. It increased when I had a limnology class during my undergraduate class. A small pond had such lovely living environment. There were wonderful plants and organisms interacting with the plants - a beautiful water environment. I was hooked up with the environment. That led me to do masters in Environmental Sciences. I studied several theoretical environmental subjects with passion. Environmental Chemistry, Environmental Biology, Toxicology and Statistics were some of my favorite subjects. I wanted to do some research that would benefit the environment. Tamilnadu had several industries and environmental pollution was a new topic at that time. I tried to do

some research in Salem steel plant effluents, but somehow I could not get into getting samples. Then I succeeded in working with Paper and Pulp mill effluents at Seshasayee paper mills, Erode. The problem with pulp and paper mill effluents was the color that was imparted to the receiving water bodies by the lignin in the effluent. It creates an unaesthetic look and was even harmful to the water bodies. So it was a much needed effort for removing the color from the effluent. The Seshasayee paper board was kind enough to allow me to sample their effluents and work on it. I stayed with their workers and it was wonderful time. The industry itself was environmental friendly.

Figure 20. Color Removal from Pulp and Paper mill effluent



The surrounding area was sugar cane farmers and the waste from sugar cane is called bagasse, which was mainly used as raw material for manufacturing paper and pulp. While processing

the bagasse, the extra steam was used for cooking purposes for the workers, so canteen food was cheap. I enjoyed eating those foods and explored on what I am going to do to remove color in their small but wonderful specific library. Meanwhile I noticed a Senior Scientist doing some research; I introduced myself to him and learned that he was trying to solve the same problem using biological methods especially using a fungus which degrades lignin. It was very interesting and cost effective method. Only problem with that solution is that biological process takes time to remove color and also they needed to store the effluents which were a constraint. After getting enough literature, knowledge from the biological scientist and five cans of effluents, I came back to lab. Our group had 3 other scientist and they were working on tannery effluents, molasses industry effluents and gelatin industry effluent. With the guidance of senior scientist, I took the electrolysis method to remove lignin from the effluent. I succeeded in removing the color with less amount electricity.

I think this method will be more successful now because of the solar energy technologies. Solar energy could be utilized to do the electrolysis and remove the color from the effluent and it would be very cost effective and work faster than the biological methods. I gave my reports and was well satisfied with my research outcome.

At the end of this research made me to move over to biological solutions. In my another masters degree I took to bioremediation using bio-indicating plant to remove heavy metal from polluted water bodies. *Portulaca oleracea* was the plant I used; they efficiently and successfully removed various heavy metals from the polluted water. I set up the experiment and started observing the plants with passion. Portulaca's common name is Purslane. Later I came to know among vegan source for omega 3 fatty acids, Purslane was one of the best sources. I was so much into the research that I could say this plant had absorbed copper just by seeing the damage in the plant.

Figure21. Copper absorbed by the plant stem



After successfully completing this research I wanted to pursue highest degree in United States and I wanted to do Environmental Water Research. I think I was guided by almighty to do research on Chesapeake Bay Watershed. My PhD guide was also as passionate as me towards environment. I love water bodies and after seeing Chesapeake Bay watershed area, the nature at its best, I liked it very much. Since some areas of the bay were deteriorating, I wanted to research on Chesapeake Bay and see what is contributing toward the pollution and toxicity to the bay. I did my research on Toxicity of Chesapeake Bay tributaries sediments with every bit of sincerity. The results came in and my model showed the Pocomoke River sediments had more toxicity. In that summer several hundreds of fishes died and floated in the Pocomoke river. The toxicity was due to the non point sources pollutants. Enormous growth of a toxic biflagellates due to non-point source pollution caused the massive fish kill. I was pleased to indicate that the river was polluted and this has brought good attention to the Maryland officials and they took several

precautions, so it does not happen in future. After several years I revisited the Chesapeake Bay Watershed and noticed a board indicating that the bay has recovered nicely. It was a great feeling to know that. As always I admire the natural beauty of the great Chesapeake Bay. I got the opportunity to publish scientific papers in refereed scientific journals.

Figure22. Collecting Sediment Sample



This is what I call the passion. Because of this passion, I did all the environmental research and always want to contribute to the Environment. I try to use resources as minimum as

possible, I reuse and recycle. I also create environmental awareness and will be the first person who would suggest a friend on how they can become environmental friendly person. Even in the Information Technology field, I have minimized the use paper and reduced carbon footprint. With my passion I created a dream Environmental Project called EA Farms - Sustainable Organic Natural Agricultural - SONA land development. In Hindi language SONA means GOLD. Surely, I consider this project to be GOLD. Because of my passion towards it, it makes me to value it as GOLD, for that matter, even more than GOLD.

Whatever good you are doing, do it with passion and you can take it to next level. Also, please have a passion towards the clean environment and it will have a good impact on the Planet and future generations to come.

Chapter 15



Environmental Actions

Just talking or writing will not accomplish what you aim to completely do. You have to practice and take action to see the result in any field. Whatever you have planned should be performed in action as you envisioned. For example you wanted to plant trees in an area for Environmental Projects and if do not do that in action it is not going get accomplished. Here I am talking about the positive actions. If there is an environmental threat, just writes it down and send it to appropriate legislative people. Leaders who are reasonable and responsible will listen to you and would take necessary step that will benefit all the parties involved which include future generations. However you do your part for the benefit of the environment. Some of the actions may work out or some may not, but never give up your hope and consistently work towards plan and execute the action.

I had eyed several environmental jobs and with my passion I wanted to contribute to research in the field. So after completing my doctoral degree, I tried to enter a university to teach and research in the environmental topics. Also, I had applied for several positions in United States Environmental Protection Agency. Somehow I was not able to succeed in these two objectives. I succeeded in Database related Information Technology jobs using my skills that I acquired in analyzing the data I got from the samples during my doctoral research. I became expert in data modeling, data analysis, relational databases, coding and various information technologies. I used those skill sets to survive and fund for my own environmental projects. Even on the years when I worked as Information Technology Analyst, I kept up with latest trends and topics in Environmental Sciences, since it is my passion.

One day when every favorable condition existed, I developed the EA Farms Project – Sustainable Organic Natural Agriculture – Land Development – Environmental Project. I have put enormous amount of time, interest, planning and research on this project. As usual lots of hurdles come in the way and each one was taken care with positive actions. Even though the plan was scripted, the real action was taken by brother, who is not only hard working but also passionate towards sustainable agriculture. His actions have made the project successful and fruitful. He has planted several trees to support the environment. He had converted a chemically abused land into a sustainable organic natural agricultural land. Without such actions nothing can be achieved.

My environmental action and Project:

Land:

The proposed land is in Puravipalayam a well-known place near Pollachi, situated in the foothills of Western Ghats of South India bordering the neighbor state Kerala. EnviroApps Inc (EA) will utilize this land for the Bio-model prototype project. The land has been used primarily for agricultural purpose. Pesticides and Insecticides have been consistently used in this land. Geographical Information System (GIS) will be used after purchasing the land to digitalize the land for this study with the help of local GIS engineers. Fencing will be done using recycled materials along with plants, which help in the hydrological cycle. Local resources from schools, colleges will be given an opportunity to plant these saplings to create an environmental awareness in the area. The future necessity in one of the most populated countries like India is sustainable growth. These students will be taught on the principles of sustainable development and environmental cleanliness, which they would spread to the society and build the future India with environmental awareness. A temple is adjacent to this land, which can be accessed for praying and meditation.

Land treatment:

Chemical levels will be measured in the soil simultaneously during fencing. EnviroApps Inc. Land Treatment™ will be given. Chemical levels will be measured after each treatment. When the level comes to the normal limits, further models of the projects will be carried out. During this process, local resources will be used (such as University, College level Biology, Computer and Environmental Sciences students).

Phase II:

Rain Water Harvesting, Water Systems & Water Treatment Plants:

Rainwater harvesting will be done using recycling model with focus on ground water replenishment, hydrological cycle using plants and trees. We already have implemented rainwater harvest projects in Indian villages, successfully. Water treatment will have Primary (Physical), Secondary (Biological) and Tertiary Treatments (Experienced Civil, Structural, Environmental & Electrical engineers will be used as resources).

Plant, Dairy Products & Green House Development:

Medicinal plants will be planted during this phase in the low cost green houses. Cattle will be grown primarily for the dairy products (strictly not for meat). EnviroApps Inc will focus on Environmental Health issues also. Diabetes and Cholesterol issues are the major problem in India. Quality dairy products such as Skim Milk and organic nutritional products will be produced (Food and Nutrition degree students will be utilized in this project).

Phase III:

Eco Tour: Eco Tour will be one of our products that will create Environmental Awareness. People with biology knowledge will be used as Eco-tour guides. We are situated in the foothills of

naturally diversified Anamalai hills. The Indira Gandhi Wildlife sanctuary has a wide range of rich fauna and flora. Several activities such as Elephant ride, boating, trekking, bird and animal watching will be part of the Eco-tour along with natural farm visit. Small but comfortable vehicles with expert drivers will be used for traveling. Currently EA Eco-tour consists of five vehicles and will be increased as the business grows. These vehicles will be used for creating environmental awareness also.

Green Colony & Resorts:

After achieving success in the Phase I and Phase II, EA will begin constructing the Green Colony and Resorts. Four building blocks of each will be initially built with a swimming pool. Recycled materials will be used as much as possible for the construction. Energy will be generated from natural resources such as wind, solar, and bio-energy.

Sustainable Research Institute:

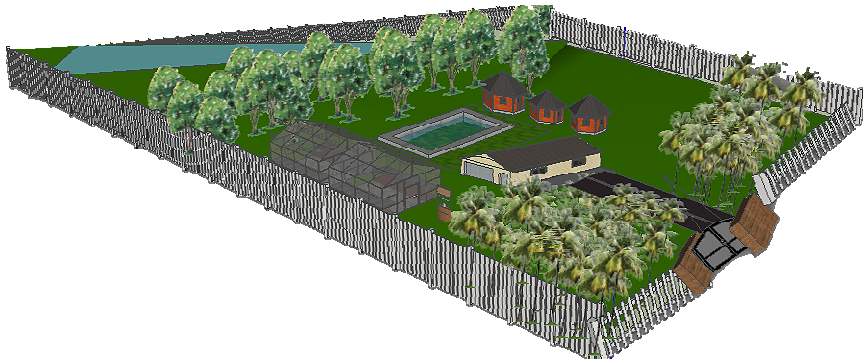
Even though Sustainable Research Institute is mentioned as the last phase of this project, the research will be starting from Phase I of the project. Each and every aspect of the project will be documented and the outcome of the project will be published in International refereed journals. This institute will focus on sustainable development with great emphasis on Environmental Sciences, Engineering, Civil and Structural Engineering, Biological Sciences and Information Technology. Equal opportunity will be given in this institute. Reduce Reuse and Recycle concepts will be followed in every aspects of the project.

This Sustainable Bio-Model Land development project will be the pilot model that will be implemented in various parts of the world according to the prevailing conditions.

After taking necessary hard working actions towards the planned projects, in five years we have achieved most of our goals. We will achieve all our goals in future. This is what I mean by taking environmental actions. You may face hurdles, but have a

plan and take slow and steady steps and actions towards achieving your goal. One day what you have thought as a simple concept would have grown into an excellent enormous environmental project. My brother because of his passion he is calling this land as 13 acres of heaven. Because of the productivity of this project, it has created awareness to the neighboring farmers. They have stopped thinking of selling the farms to real estate agents and continue further with agriculture. That's what I consider a success due to our environmental actions.

Figure23. EA Farms Model



I am proud of the whole project and feel completely satisfied and feel I have done some part which is good towards the environment.

Chapter 16



Followup and Improve

After you build a project or even small action, do not stop there; always follow up to see how that the project is going on. You need to tweak on the project to be successful and this can be achieved by follow up. In Information technology terms this is called maintenance of a project. Some actions of the projects may be successful and some may be failure. Failures contribute to the success. We can do whatever we think is right, but nature takes its own course. The success is achieved only when we follow up our actions and adapt to the situation.

One example I would like to give from our EA Farms is the Apiary project. Since we started the project from almost chemically used up barren land, we though apiary should be first priority, so that we can produce honey and as well as bees will help our crops to yield more. So we placed several bee boxes. Since there were no flowers in the immediate areas, the bees flew out of the boxes. Now we have only few boxes yielding honey. However, the bee population increased in the area, so we were happy even though our apiary project was not commercially success, the bees were there and in future we have increased the crop yield.

In our EA Farms project we follow up on every sub projects we implement. It is the trying, trial, error and follow-up methods and practices have contributed towards our goals. You can plant several trees for betterment of the environment, but if you do not follow up with actions such as watering, the project will not succeed. So in an environmental project it is very important to follow up after the actions you take. Let us see how an Individual, Group, Society, Nations and Governments can take actions; follow up on environmental well being.

From Individual Level:

Every individual should take action even if it small to protect the environment. Simple things such as

- Putting off light or any electrical devices when you do not use would save power,
- Stopping running water while brushing and shaving,
- Stopping unnecessary paper printing
- Even practicing vegetarianism at least one day a week will be positive impact on the environment.
- Planting trees will positively help the environment for sure.

If you are qualified and have the capacity to write projects and proposals, you have to try and obtain funding for the improvement of the Environment. The following is a proposal I wrote recently regarding getting safe water to communities.

Describe the project and make clear its primary aims:

As an Environmental Scientist who worked in water related research, I am always fascinated by water and water bodies.

We are in a time when water is sold for consumption. Climate changes and draughts indicate that we will be in scarce of proper sanitized drinking water in the future. It would be even more very hard for poor people to get access to such kind of water. I have seen people especially women carrying water for miles for day to day consumption. That water they carry may carry harmful pathogens and other chemicals which they don't see through regular eyes. It is a health hazard to them and their family. My project represents them and gives an opportunity for them to have better sanitized drinking water with minimal cost to them.

After extensive research in water and water related fields, I always felt natural treatment ways are better to human health rather than to input more chemicals into the water in the name of the treatment.

Figure24. Natural Sustainable Water Treatment



Potable water for poor people all over the globe can be achieved through this project. Before we try at a Global level, I would try a pilot project in an area where I am familiar with and

conducting such similar projects already. This area consists of poor people who have little resources to get sanitized water. My idea is similar to conventional treatments methods - primary, secondary and tertiary treatments. However the innovative difference comes in the usage of natural indigenous products in these treatments which have been traditionally used by the people.

Some of the people living in the area have water tanks and the project's objective is to convert these tanks to mini water treatment plants using natural products. After these treatments natural taste inducing substances which has been historically used as healthy ingredients will be added to the treated water before being consumed. People who don't have water tanks will be provided with the new mini water treatment containers.

Health of the people before and after the water tank will be studied using scientific methods and statistics.

Main Objectives:

- 1) Provide individual Mini Water treatment tanks to individual in a study village where most poor people do not have access to proper sanitization and potable drinking water
- 2) Mini water tank will have primary, secondary and tertiary treatment chambers which would be made of natural materials
- 3) Add natural taste inducing natural substances which has shown health benefits historically after water treatments
- 4) Scientifically and statistically study health of the individuals before and after using the water treatment tanks to prove the health benefits
- 5) Further studies and improvements will be made based on this pilot study
- 6) Take the study into a Global Project to improve the quality of potable water for people, especially the poor people

Project background

As we move towards water scarcity, more and more people move further away from access to sanitized potable water.

Cost of water treatment is also on the rise and poor people will have to compete more to get their share of water.

This project will give a low cost water treatment and help the under privileged people to improve health and to fight against water borne diseases in natural and sustainable way.

Once the project is a success in the pilot study it could be taken to a Global level, which will help the poor people to drink treated and naturally taste enhanced drinking water.

Governments, scientists, professionals, communities and individuals are always putting in efforts for improving drinking water supply and sanitation.

However financial constraints especially to poor rural sector still lack access to sanitation and potable drinking water in developing countries.

Still women have to walk miles to carry water for daily use.

However, this water contains pathogens and dreadful pollutants.

Dreadful water borne diseases such as Cholera, Diarrhea, Filariasis, Malaria and Typhoid spread through these waters can cause havoc.

Most of the governments in the world always want to provide sanitized potable water to all its citizens.

This project will support the government's policy and government will support this project for benefit of the people.

How does the project meet regulatory or other legal compliance requirements in the location(s) where it will be carried out?

Our project - EA Farms Sustainable Organic Natural Agriculture is already in its 7th year.

What was once becoming sterile land with years of chemical agriculture has been converted to sustainable organic natural agriculture land and is following Zero budget farming (<http://enviroapps.blogspot.com/2012/01/zero-budget-natural-farming-sustainable.html>).

We are developing this with the support of National, State and Local government.

We have implemented products that were subsidized by the government. One example is the usage of Solar Energy for distributing water.

Project details - <http://eafarms.enviroapps.com>

- <http://enviroapps.blogspot.com/2008/05/ea-project.html>

We also have full support of local communities, leaders and individuals for such type of positive project.

EnviroApps Inc have followed and will follow all the regulatory and legal compliance requirements.

How does it set a high benchmark for innovation?

Even though the project follows the traditional water treatment steps, natural materials will be used for these treatments.

Natural products, to be more specific - these are natural byproducts and will be used as treatment media.

Mini treatment tanks will be provided to homes in project village. Participating people will be health checked before and benchmarked periods to see the health improvements.

Water will also be analyzed before and after treatments.

Data will be analyzed and predication models will be extracted from the available data.

Health and human resource is deteriorating in the area because of Government sponsored liquor usage by people.

This treated water along with awareness will increase the health benefits of the people.

Project goals

Describe how the project advances sustainable access to safe water where it is presently at risk and/or access to improved sanitation?

Several people still do not have proper sanitation and potable drinking water in the area and in most non developed part of the Globe.

By developing this project individuals (homes) will have mini water treatment tanks which will improve the water quality.

These treatment tanks will use natural materials and the cost of its operation will be very minimal which even poor people could afford or the government can financially support to provide the tanks.

a) Uses improved technologies:

The project product - mini water treatment tank will use available best natural by-product materials for the treatments.

Ease of use especially by women who carry water - Tanks design was improved for logistics by other individuals.

Before and after results will be measured using latest technologies, instruments, databases and statistics software.

b) Has practical applicability and addresses identified need:

EnviroApps Inc - Mini water treatment tank will have practical applicability for providing treated drinkable water to people who don't have access to such kind of water.

It is also sustainable since chemicals are avoided and natural substances will be used in treatment of water.

Treated water will also be taste induced by historically known health benefit providing natural substances.

We envision this type of treatment is available to all individuals for purifying their drinking water.

c) Advances related issues such as health, education, or human rights:

My definition of sustainable growth includes the following:

- 1) Greed eradication
- 2) Education people
- 3) Creating awareness
- 4) Being truthful
- 5) Following hard working ethics
- 6) Thinking positively and contributing
- 7) Creating clean environment
- 8) Having a great future vision
- 9) Living harmoniously without any discrimination and treating people equally.

We follow these steps and create a good society. This project will create benefits, improve health and education especially water treatment. Project and product will be available to individuals and homes without any discrimination.

Project will create better benefits for humans, will affect their rights and will lead to improve the society. We also educate as many people in different fields such as environmental, Information Technology, Database analyses during our project implementation.

d) Promotes non-discrimination/equity of access:

Project product will be provided to individuals, homes without any discrimination.

All individuals and homes will have the equity of access of the products without any discrimination.

We already create and promote harmony through our projects, blogs and awareness creation.

e) Involves and positively impacts a range of stakeholders:

Project Implementation will provide individual with naturally treated potable water

Successful pilot project will lead to Global implementation

Society will improve

Jobs will be created

People will be educated and trained in various diversified fields

Sustainability will be improve

Human health benefits

Control of dreadful diseases

Usage of only natural and natural by-products

Use of my knowledge and implementing a wonderful project in real world

f) Has local/community-level engagement:

Through our EA Farms we have created a great awareness on Sustainable Organic Natural Agriculture (SONA - which means Gold in Indian language).

We compare our project to GOLD (A precious metal that is greatly valued). We have created awareness to local people on Sustainable Land Development.

Farmers in the region were selling their lands to real estate to build buildings and high rise hotels. Our endeavors into Sustainable farming in the region have made farmers to rethink about selling their lands. I think that is our success. We are recording this success through the blog and social media to create more awareness about sustainability.

This way we engage people both locally and globally.

Project outcomes

Describe the expected project outcomes including number of people likely to be served over the short and long term.

We truthfully expect positive outcome from the project.

People will have better drinking water which is treated using natural materials in as sustainable way.

The pilot project will help people living near EA Farms.

Short term project will benefit approximately 5000 individuals and long term it will benefit most of people especially poor people in many countries.

Sustainability

Provide information regarding the long-term technological, economic, social and environmental sustainability of the project highlighting how it is replicable and scalable.

At EnviroApps Inc, all our products and projects focus on environment, sustainability, information technology, data, awareness and education.

This particular mini water treatment tank will help in people's access to good treated water and enhance the health benefits in a natural sustainable way.

We envision successful pilot study and show positive results as we have shown before. Since the product is low cost it can be easily replicated and taken into Global level.

This will benefit individuals, villages and even countries. When people get good water and food, lots of problem is solved there. Then education and job lead to positively scalable growth.

We also have successful track training people in environmental and information technology fields. While this project is implemented we will train further more people in diversified fields.

Project plan

Sustainable Natural Mini Water Project is a new project. However it is a part of a big project called EA Farms - Sustainable Organic Natural Agriculture (SONA) under EnviroApps Natural Land Development.

We are involved in producing products such as coconut, pulses, lentils and more. We also use natural resources such as solar energy and bio-gas.

Our project objectives and details can be read at:

<http://enviroapps.blogspot.com/2008/05/ea-project.html>

Our achievement can be visualized at:

<http://eafarms.enviroapps.com>

As an Environmental Scientist who has done research in water, sediments and water treatments, I want to contribute to human society especially in support of under privileged people.

As an individual you can support the environment in many ways and the above type of project planning is also a contribution to the safe environment.

Groups and Societies:

If an individual can contribute in such a way think about what a group can do. In this information technological era, each and every data is a resource. A group can work on projects and contribute to an enormous amount of data. For example climate related data can be enormous. We are in this beautiful era where I can see the weather forecast of a village in India where the farm is located from my desk at United States of America. People are posting rainfall pictures, so I can see that it rained there. Such enormous amount of data known as big data is available from such groups. This can be harnessed in analyses and used for modeling, reports and predictions. These social media groups should contribute at least some part of their time towards the environment. That will add up and create awareness. This is the current status of technology that can be used for the benefit of awareness and then take that into action. I have seen posts that shows the benefits of the trees, how to avoid throwing pollutants into the environment, etc. This as a group will have positive outcome.

That was an explanation of how digital groups can help in creating good environments and that should be mimicked in real world also. Like minded individuals can form groups to do the

positive actions. Groups can have activities such as planting trees, clean up polluted areas, create awareness to people and make them fun activities for children also. Such actions have been fruitful within few years of action. Trees will grow; water bodies will be clean and will be very aesthetic for people. When you shine as an individual in contributing towards the environment, you need to convert that into a group by adding more people and leading the green activities.

Environmental groups can work in both environments – digitally and in real environment. They can focus on creating awareness, reporting, follow ups and the outcome. Group activities can be very successful such as cleaning a beach, planting trees, and volunteering in other environmental activities. Groups also can help during disasters such as cleaning the animals and birds that are affected by the oil spills. Groups always can and is important in better the environment. Groups can lead to society that will end up following the best practices to live harmoniously with the environment. As I have said before societies should act without greed, educate and create awareness among people, be truthful, following hard working ethics, thinking positively and contributing, aid in creating clean environment. They also should have a great future vision and preach people to living harmoniously without any discrimination and treating people equally. This will lead to proper conservation principles and ecojustice for all inhabitants of our Great Planet.

Nations and Governments:

It will be great for the environment when nations and governments act on preserving environment. Nations and governments should not think only about immediate problems and solutions. They should make decisions including environmental impacts and then take a rational decision. Developed nations have become most resource consuming and developing nations are taking actions that contribute to pollution. Nations are not considering alarming resource depletion. Few examples are fertile soil removal for other purposes rather than

food production, mining, fossil fuel extraction and so many other nonrenewable resources depletion.

Soil resources are important part of any Nation and the governments need to take high priority in protecting them. Some resources have gone to wrong hands and because of their greed the resources are severely depleted. Lands, mountains and beaches are extensively altered to extract minerals. They not only affect the environment, but also affect economics of the countries in future.

Water resources are another resource that should be handled very carefully. Water scarcity is becoming regular part of life. Coastal waters are highly polluted everywhere in the world. Coastal areas have become soup of human made chemicals and biological waste (mainly due to sewage) and have severely deteriorated both ocean fauna and flora. Lakes, streams, ponds and all other water bodies should be properly maintained and managed, if it is not properly managed, economics of countries will be affected.

Forests are very important resource of any country. They are there for a reason. However, deforestation is taking place at an alarming rate. Forest depletion has become an unavoidable human action. Nations and governments should take action, legalize and preserve their remaining forests as soon possible. Farmers can also help by adding an agro forest area in their farms and governments should support such activities.

Another important resource in this information technology era is – Human resource. Human resource is very important for any country. Even though life expectancy has increased due to the medical field advances, humans are exposed to more environmental stresses such as air pollution. The enormous amount of cars humans use is a major contributor to the air pollutants. Some cities have already been covered in smog and contribute to health hazards of humans. Humans also use chemicals in food productions and pollutants bio-accumulate in food which is also an environmental stress. Humans drink

polluted water which also puts additional stress in the body. Important life sustaining factors such as air, water and food are contributing to the health stress of the humans. Humans are also exposed to radiation in all forms of the electronic devices including the mobile phones. Additionally consuming alcohol, smoking and drug usages symbiotically affects the human health. Some governments are thriving upon the alcohol supply to their citizens. Even though they make money immediately, they are losing a lot because of alcohol effects to their human resources. Once the human resources are depleted the country goes down.

Some people (opposition parties) will oppose all the conservation and give various other arguments to support their views. But it is very important for Nations and their Governments to take proper action to conserve their natural resource. Along with that they need to curb the pollution and take necessary Environmental health actions to safeguard their human resources. That will be great for future generations to come.

Global Environment and its Protection:

As globalization is becoming more and more part of life in this information technology era, we are now understanding that a small affect that is done in some part of the world can affect the whole world. We all know that air pollution is not confined to one area, it is a global problem. Air polluted in one country is dispersed and circulated all over the Globe. Green house gases let by country is not only affecting its citizens, but entirely affecting the whole world. Climate changes are occurring very rapidly. It is November in Florida and the temperatures are more than a hot day in summer. Brothers and sisters living in coastal area of the world are affected more than anyone else. Droughts are forming at an alarming rate. This is not an environmental problem anymore, it becomes problem for human survival ability. Deforestation can also be a global problem. Cutting trees can reduce the carbon dioxide sink, which can affect the climate of the Globe. Coastal pollution can also be considered global problem. Fish population is reducing and fishermen tend to fish across the border and hence

the conflict starts. Depleted aquifers (ground water) along with bombings due to war can affect the plates and cause unpredicted earth quakes.

Global bodies such as United Nations Organization need to study every environmental problem as a global problem and come up with an International solution to protect the environment. The entire pollution problem need to be scrutinized more and studied fully and thoroughly to see what the effects are – Whether it will affect Globally. Oil spills, deforestation, air pollution and environmental health issues are becoming Global threat and these needs to be rectified at a Global level. Global legislation for air pollutants must be made and strictly adhered, so future generation can breathe normal and good air instead of toxins. Pollutants should be monitored and data should be analyzed at Global level – since they are not confined to – as only local problems any more.

Chapter 17



My Contribution to Environment

I had the opportunity to teach Environmental Sciences to small kids (bunch of 3rd graders) during this week. I have taught the subject to under and post graduate students. After few years of break, I had this opportunity. Since, lots of news about BP oil Pollution (They were going to pay billions of dollars as fine) was going on, I choose to create a model that explains how oil pollution happens and how it gets cleaned.

Marine Oil Pollution and Clean Up:

I bought some sand from Home Depot. I used a plastic box, shoe box and filled with the sand sliding from top to bottom. I created blue water using water and blue colored ink. It turned out as a good Ocean model. All the kids were watching with full curiosity. I made an 'Oil Barge' with simple small candle light stand on small ship shaped wooden plank which I got from 'Michaels' store. I used left over cooking oil (which I take to recycling center) and colored it with some black color. That cooking oil now looked like crude oil and I poured them in the candle stand tanks of my oil barge model. It was floating in my clean Ocean model.

All of sudden, I turned barge and oil fell into the Ocean and spread. I heard a big 'ooh' sound from the kids. I had made oil containers to contain oil spread using left over 'felt' and threw them around the oil polluted area. It contained the oil spread. I used cotton to absorb the oil and make my Ocean model once again a clean environment. I took some marine animal toys

including a pelican toy and covered them with oil and taught them how to clean the oil soaked animals with dilute soap solution and dry them with towel. I told them to visualize the whole thing in real world and showed the pictures. All of them clearly understood how oil pollution occurs and how it can be cleaned.

Good Sample Identification:

Before going to teach in, I made three solutions - Solution A - Vinegar, Solution B - Baking soda solution and C - Filtered water. I bought pH paper from 'Amazon.com'. I told them there is a site where people are affected from a natural disaster and they don't know which water they could drink. They send us three samples and asked us to find which sample can be used as drinking water. Kids used their school tap water (filtered using Brita water filter) as control and using pH paper they found that Solution A was an Acid, B - was a base and C was drinkable water. They were happy to find out the drinkable water and to know they have saved people from drinking the wrong water. I felt this was a good small experiment to kids to identify the toxicity, which I fully used in my PhD research.

Water treatment:

I procured some Alum from 'Amazon.com'. I took some tap water and added some dirt solids and made a polluted water sample. Now added the alum and did some swirling (to give centrifugal force) and allowed that bottle content to settle. After few minutes the solids settled down and the above water as clean as we mixed the dirt before. I told them this is one of the steps how they treat water before it comes through the tap. Along with this primary (Physical) treatment, they also do secondary (biological) treatment and tertiary (Chemical) treatment.

Aquatic Biosphere:

I had collected some aquatic plants and water from our community pond. I used a clean glass bottle and added some filtered water. Then I added the pond water. That's when I noticed some small water bugs were also in the pond water. The children were happy to see the bugs. I added some of aquatic plants in the water and closed the bottle and told them to keep it near a corner in the table and watch the bottle. The bugs were happily swimming in the water. After a week I will bring it back and let them in the community Pond again. I told them in future (several years) if we don't reduce pollution, the future generations should have to live in contained self-sustainable biospheres and this bottle aquatic biosphere is one such example.

Safety:

I emphasized that in labs - safety is important. There may be several chemicals and biological organisms. So it is very important to follow safety procedures such as wearing lab coat, gloves, safety eye glasses and sometimes even mask. I used all these and showed them how the experiments are conducted in a real lab.

Renewable and Biodegradable:

I talked about Natural Renewable energies such as SOLAR and WIND. Also I talked about Biodegradable materials. I showed models of them.

Finally, I told them how they can save the earth by using the paper they write fully instead of writing one line and throw. I told them about Reduce, Reuse and Recycle - Three R's. Also, told them not to waste water. In US, we are privileged to have water coming to us, but in some parts of the world to get water they have to travel so much. They really understood and were happy to be part of people, who would save the Earth, Environment and its Nature. These wonderful gifted and knowledgeable kids send me

individual handmade cards to thank me for teaching those Environmental Sciences topics. It was a fulfilling day for me.

Teach In Environmental Sciences Green House Gases to Kids:

This year again, I had the opportunity to teach environmental sciences and information technology to fourth graders.

My topic was Green House Gases. I started with the atmospheric layers and talked about the lower layers:

Stratosphere: 12 to 50 km (7 to 31 miles),

Troposphere: 0 to 12 km (0 to 7 miles).

Took a small car and globe model and compared them to explain the Green House Effect by showing how the car gets heated when parked in Sun. Explained to them that similar to the car, Earth gets warmer because of these GHGs acting like a windshield in the car.

Then I started to show them the box model. I created a beach environment with sand and water (added blue color to make it look like ocean). In middle of the ocean I created a small island. I placed some small buildings made of Lego pieces on the coast and on the island. In one end of the box apposite to the beach I packed frozen ice (to simulate the Arctic frozen Tundra).

Box Model - Frozen Area, Ocean, Island and Coastal Area

I closed the box with a glass lid and left a space to heat the ice using a hair dryer acting as a heat source (Sun). Ice started melting; water level rose and at one stage Whole Island was under the Ocean, Lego buildings were under water and beach area resided. Now they understood the greenhouse effect clearly and the damage it can cause.

Then I talked about the Green House Gases and their sources:

Carbon dioxide (CO₂), Methane (CH₄), Nitrous oxide (N₂O), Ozone (O₃), and CFCs

CO₂ - Burning Fossil Fuels – Energy Uses – Fuel used for Electricity Generations, Petroleum and Natural gas emissions.

CH₄ - Landfills, Coal Mines, Oil and Gas production, and Agriculture

N₂O - Agriculture, Transportation and Industries

O₃ - Fuel combustion

CFCs - Paints, aerosol sprays, cleaning solvents and coolants

Told them about the Environmental, Human Health and Economic impacts of GHGs

As the overall average annual temperatures of the globe are expected to increase:

Snow, Sea Ice and Glacier areas will decrease by melting, which will cause

Sea levels to rise, coastal flooding to increase and climatic condition changes.

Storms and heat waves will occur more along with dreadful disease, famine and increase in invasive species.

Dehydration, heat stroke, respiratory, cardiovascular, skin problems and diseases such as cancers, and diseases from water, food, and rodent-borne will increase. Human health effects will not only affect health and social support systems, but also cause economic stress.

Agriculture, forestry, tourism and recreation and events including sporting events will be affected. Damage to human made

structures such as roads, buildings, bridges will happen from extreme weather conditions.

I explained them how you can help at individual levels:

I asked them to turn off the bulbs when they left their rooms.

Tell their parents to combine trips when they go out.

I asked them to conserve water.

I told them to reduce the use of polluting materials, reuse and recycle as much as you can.

Also, told them to plant trees and plants whenever they are able to do.

These are some of the small steps they could take to contribute towards protecting our planet. I told them how I analyze data that we acquire from the environment to model and predict after effects. To do our part we created EA Farms and planted so many trees. This is how as an environmental scientist and as an information technologist, I contributed and still contributing to the benefit of the Globe and future generations to come.

I know there are several people including some scientists who do not believe in GHGs causing these effects. But as an environmental scientist, I believe they contribute to some extent, at least. However, deforestation makes the effects grow more exponentially.

At the end of the teach in section, all the kids were worried about the islands, coastal areas, its inhabitants, people who will be affected by storms, hurricanes, cyclones, typhoons, tornadoes, heat and drought. They all immediately wanted to contribute to protect the planet, our Mother EARTH.

My contribution of conducting scientific research, writing and publishing scientific publications:

Effects of heavy metals on *Portulaca oleracea* Linn -

Proc. Acad. Environ, Biol, May 2, 1996, Thangavel, P. and Subburam, V

Bio & Phyto remediation, Bio Accumulation of heavy metals from polluted aqueous media.

Toxicity study of a Chesapeake Bay tributary - Wicomico River

Chemosphere, March 1996, Gian Gupta

Toxicity identification of pocomoke river porewater

Chemosphere, February 1996, Gian Gupta

Chronological changes in toxicity of and heavy metals in sediments of two Chesapeake Bay tributaries

Journal of Hazardous Materials, April 1998, Gian Gupta

Heavy metals in sediments of two Chesapeake Bay tributaries — Wicomico and Pocomoke Rivers

Journal of Hazardous Materials, September 1996, Gian Gupta

Impact of Point and Nonpoint Source Pollution on Pore Waters of Two Chesapeake Bay Tributaries

Ecotoxicology and Environmental Safety, October 1996

Gian Gupta

Effect of Simulated Sunlight on Atrazine and Metolachlor Toxicity of Surface Waters

Ecotoxicology and Environmental Safety, May 1999

Yaw-Jian Lin, Anugrah Shaw and Gian Gupta

Effect of River and Wetland Sediments on Toxicity of Metolachlor

Ecotoxicology and Environmental Safety, March 1997

Girvin Liggans and Gian Gupta

Halophilic heavy metal tolerant bacteria from Vembanad Lake as possible means of bioremediation of lead and cadmium

Journal of Environmental Biology, July 1, 2014

M Sowmya, MP Rejula, PG Rejith, M Mohan, AAM Hatha

Journal of Environmental Biology 35, 655-660

Abstract from Ph.D Dissertation:

Title: TOXICITY STUDIS OF TWO CHESAPEAKE BAY TRIBUTARIES

The Chesapeake Bay biological communities are degraded by the inflow of nutrients, sediments and toxic contaminants. Wicomico and Pocomoke Rivers (WR and PR) are two of the 150 rivers and streams that feed into the bay. The objective of this study was to use USEPA Toxicity Identification Evaluation (TIE) tests to identify the toxicants in the sediment porewater of the Chesapeake Bay tributaries - WR and PR. Samples from three different depths (0 - 7.7 cm, 7.8 cm - 15.4 cm and 15.5 - 23.1 cm) at four different sites (1.6 km upstream, adjacent to, 1.6 and 3.2 km after the municipal sewage treatment plant - STP outlet) were collected. The sediment samples were tested for toxicity (EC₅₀) using the marine luminescent bacteria (*Vibrio fischeri*), TOXITRAK™ toxicity test (Inhibition - %I), and *Ceriodaphnia dubia* (48 - hr - survival - %S). Toxicity (Microtox EC₅₀ = 21.3% and 12.8, Inhibition - %I = 86 and 93, Survival %S = 22 and 11 for WR and PR sediment-porewater, respectively) was significantly high for the samples collected adjacent to the STP outlet and 1.6

km after STP (near a poultry farm) outlet for WR and PR, respectively. Toxicity of porewater reduced significantly with depth at every sampling site in both the rivers. Qualitative MetPLATE™ analysis showed that toxic forms of heavy metals were present only in the sampling site adjacent to STP outlet in WE and in all sites in PR. Phase I TIE tests proved that the toxicity was due to ammonia and heavy metals and not from organic compounds in WR, whereas the toxicity of PR was due to oxidants, heavy metals and organic compounds. Phase II TIE tests identified ammonia, zinc (Zn), lead (Pb), copper (Cu) and cadmium (Cd) as the toxicants in WR. In PR, along with these metals arsenic (As), oxidants (Chlorine), and organic compounds (PCBs and pesticides) were also identified as the toxicants. High concentrations of metals in sediment were normalized against organic carbon content and the correlation coefficient was found to be high in all cases. The STP is source of toxicity to WR. Along with STP, agriculture (including poultry farm) runoff is the main source of toxicants into the PR.

From above abstract you could notice that Pocomoke River was polluted mainly from non-point source and hence the massive fish kills occurred. This study also contributed towards State of Maryland to action to restore Chesapeake Bay watershed. It is great to know that Chesapeake Bay is recovering at a very good rate.

EnviroApps – www.enviroapps.com

With all the education, experience and knowledge I wanted to contribute to Environmental and Information Technology fields without much inhibition. That is the reason we started EnviroApps Inc. - At EnviroApps we are dedicated to bring solutions to modern challenges using environment friendly technologies empowered by human imagination and care for the future generation. Our process of engineering development and deployment follow the GISTS (Green Infra Structure Technology Solutions) architecture to be eco-efficient and help transforming our engineers' imaginative ideas in to products and solutions.

Come and create with us the green futuristic solutions. We collaborate with Environmental Scientists all over the Globe.

Figure25. My Scientist Friend Dr. Hatha in Arctic Area



EnviroApps Inc led to two best products –

Environmental Product (Project):

EA Farms – <http://eafarms.enviroapps.com>

EA Farms is located near Pollachi in Coimbatore district, Tamilnadu, India. EA Farms is a **Sustainable Organic Natural Agricultural Land Development Farm**. We are involved in **Coconut, Dairy, Mulberry, Groundnut, Pulses, Greens and other agricultural produce and products**. Our aim and objective is to provide uncontaminated agricultural products without disturbing the environment. We are into **Zero budget, permaculture and multiple activity agriculture**. At EA Farms, we efficiently use water and other natural resources for producing agricultural products. We have vast experience and

Modern Realistic Environmentalism

techniques in Environmental Sciences, Animal Sciences, Nutrition and Dietetics and Information Technology, which we use to improve EA Farms.

Figure26. My Brother Sekar - From IT to Farming



We are open to discussions, collaborations and research activities that are related to Environment, Agriculture and Resources.

Information Technology Product (Project):

EA PHARMICS:

We are the developers of affordable innovative quality control data management software for stability and annual product review tracking. For the last fifteen years, we have provided our clients with tools for data management, evaluation, and report generation that emphasize our principle goal of meeting our client's regulatory responsibilities.

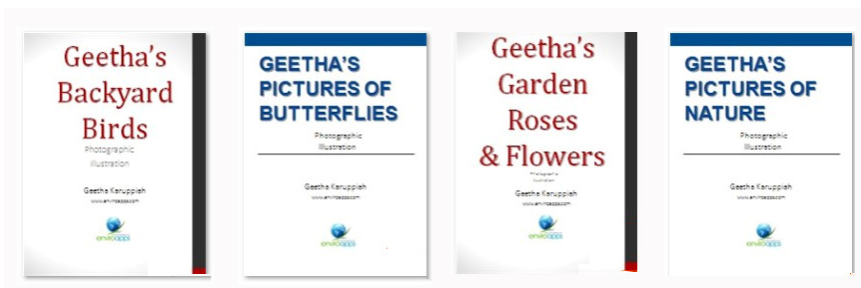
Modern Realistic Environmentalism

EAPHARMICS eSTAR stability software is a web based application integrated with oracle database to monitor all type of pharmaceutical (including controlled drug substances and biological products) stability programs. **EAPHARMICS eSTAR** is exceptionally suitable software for international regulatory guidelines like **United States Food Drug Administration-USFDA, Therapeutic Programme-TPP, International Conference on Harmonisation-ICH, Therapeutic Goods Administration-TGA, National Institute of Health Sciences - NIHS and European Medicines Agency EMA of European Union EU** guidelines. The software is designed for pre-clinical, R& D and Post market for Innovator/Generic pharmaceutical companies throughout the world.

ZoomVin – www.zoomvin.com

Through zoomvin we Create Environmental Awareness, Create Real World Environmental Niche and enhance their visual beauty digitally to Save the Environment and Wildlife. My wife have compiled several free eBooks for every one enjoy birds, butterflies, flowers (especially roses) and Nature.

Figure27. Geetha’s eBooks



I am proud of my part in developing these companies and contributing to the Environment with passion.

Figure28. A Beautiful Male Cardinal



I request you to think differently and create plans to save our wonderful environment.

Chapter 18



Modern Reality Environmentalism

In this era, it is true that if I told someone that - do not use this product 'A', since it is causing pollution, they would laugh at me. My point is we have to move to modern environmentalism in which we can only reduce the pollution rather than completely eradicate. There is no way that we can completely eradicate the pollution, but we can reduce pollution. It starts from individuals. Each individual should always focus on good positive things. It may be difficult at the beginning. But as you make it as a habit you will enjoy it. In modern world, one cannot live without a cell phone, but there is a choice that one phone can be used instead of multiple phones. The used phone can always be given to the less fortunate who would happily use it or can be recycled. These are the types of small steps in modern environmentalism. When each such deed is multiplied, pollution will be reduced. Simultaneously, when we do environmentally positive activities such as planting trees, it increases the strength of the environment. Environmentalism was followed by human kind long back, Humans used to live with nature in harmony. Not anymore. There were environmental stars such as John Muir who had done enough in their era to save the environment and pass it to us. We did not follow those stars properly and I feel it is necessary to take at least minimal action, so we can pass at least some of it to the next generation.

These environmental actions should exponentially transfer from individuals to teams and groups, at street levels, at county or municipality levels, state levels, country and Global levels. Country leaders should be passionate about the environment. In a developing country's point of view always economy takes in

precedence to environment. However damaging environment for the economy would turn back and cause countries their economic crises. Some countries just focus on the economy and completely ignore the environment. Later it haunts them by uncontrollable pollution in the form of smog, effluents in the water bodies and sterile agricultural lands. All these will lead to unhealthy individuals and cause a major problem for the country. Deforestation, air pollutants, water pollutants and chemicals in the food can cause severe health problem in individuals. Human body can only fight against these for a while and give up once it can't fight. People living in cities just see buildings. Trees are being cut for more buildings and roads. They are filled with cars. Each member of family has car. Several vehicles contribute to the air pollutants. From the tree less cities, atmosphere that is filled with SO_x, NO_x, and CO one has to breathe. In this modern era everyone wants to drive their own car even if public transportation is available. There are not even enough good roads available in some countries for the amount of the cars. Every Government should provide its citizens the options of good and efficient public transportations and regulate the individual transportation more efficiently. Those way air pollutants will be reduced enormously and people at cities can breathe some good air. Smog, particulate matters and air pollutants can be reduced. All these can be only said, it is up to the individual to action to reduce the pollution from one's end and that is main point of modern environmentalism.

In this Big Data era, even though we have enormous amount of data and analyzing power we still did not learn from these. Modeling and predictions are pointing towards environmental disasters. However, in some areas there are improvements due to the pollution reduction. Ozone hole is shrinking because the efforts put by humans. So if efforts are put in, benefits are obtainable. We have come up to the point that there is no way that there will be zero pollution or pollution free areas. All we can do is reduce the amount of pollution and try to counteract it with natural methods. These activities should start

from individuals. Let us take a construction company for example who had successfully bid for a construction project. They should not build the buildings without any space; there should be proper empty space where plants and trees can be grown. Just for greed of money they should not transfer the place into concrete jungles. Instead they should build with environmental concision and in the long run every one will be benefited. I have traveled to many parts of the globe and seen this in my life time. Deforestation happening in alarming rate, concrete buildings is packed without any greenery around them. It is getting tougher and tougher for human race to survive in these conditions.

Humans are exposed to human made chemicals starting from pre-birth. Pregnant mothers intake many harmful chemicals, inhale polluted air, drink contaminated water, eat chemically induced food (Pesticides, insecticides, fertilizers, antibiotics and hormones). Chemicals are starting its effects from the fetus. So many changes can occur in the fetus because of these chemicals. These pollutants can symbiotically and exponentially affect the health if the pregnant mother intakes alcohol, smokes and uses drugs. Most of the chemicals are neurotoxins and affects the fetus's brain. The future of the unborn child is completely affected by the unwanted chemicals. So it is very important for these mothers to be extra careful when pregnant and not use alcohols and drugs. Individual and Environmental health is a very important factor in a society. Chemical contamination starts with individuals, for example a farmer should grow his produce with less or no use of chemicals just for the sake of yield. The farmer should think about the people's health when growing his produce. Farmer's live stock should not be injected with hormones and fed antibiotics. Genetically modified organisms are in every food that comes into commercial market. All these chemicals play a part in human body and they are even classified as Endocrine disruptors. Endocrine System is very important in functioning of human body. These chemicals disrupt those systems and create irreversible damages to human bodies. Greed alone should not be the focus of the food production; producers should also think

about human race and health when they input chemicals. Even though the addition of the chemicals cannot be completely eradicated, it can be intelligently and diligently used in the production of crops, food and in breeding livestock. This is focus of Modern Environmental and its success, if at least there is some change in farmer's mind to use fewer chemicals in their farms.

In modern era another part of life is medicines. Manufacturing medicines has lost its objective of developing cure for diseases and turned into competitive business. Even with drug controlling organizations, rules and regulations damaging drugs enter into the market. Several drug companies with knowledgeable workers still produce them in massive quantities and market them with aggressive marketing techniques. The side effects are known only after years of use of the drugs and then courts are involved for class action suits against the drug companies. Again greed and competition should not play when human health is involved. If the research scientist finds some discrepancies during new drug development and in stability studies the drug should not be used. Another part of the drug in modern world ends up in the environmental systems including drinking water systems. There are no or few regulations or water treatment for drugs in water supplying plants. These drugs end up in drinking water systems and play havoc in human health. So the individuals in the pharmaceutical industry, medical fields should think about human health in developing the drug and delivering it. Greed should not play any part in this divine medical field.

In the internet era, we use so many technical devices and they all emit radiations. One doesn't have to tell how much they can affect human body. There are thousands of such devices and we carry them close to our bodies in the mode of cell phones, tablets, laptops, and in houses we have televisions, desktops and more gadgets. Day by day new gadgets are released into market and every one of us wants the new equipment even though the old ones are fine and we feel proud to have version 5 and immediately feel ashamed when using it, while the version 6 is available. The

Gadgets usage can be controlled by the individuals. That way these electronic wastes (eWastes) can be curtailed.

Nowadays we spent most of part of our lives in indoors than outdoors. I need to explain the chemicals that are in the indoors. Indoor furnitures, carpets, electronic gadgets, cleaners and several other household items are containing chemicals. These household chemicals and contaminants are not just simple chemicals, they are very strong chemicals. They can even corrode strong objects and think about how fragile human body will act against these chemicals. Some chemicals are also directly applied as a part of cosmetics and beautifications. Within few years we have transformed our living areas into a chemical soup area. No one can study the effects of these human created chemical soup areas or clean them completely. Our body and Earth have adjusted, but how long, no one knows. The difference between human body and Earth's adjustment is the astronomical years. Human body may be strong in younger stronger years however it succumbs when it gets older. So many stressful chemicals are let into the environment each day. Most of us live in this mess, are used to such conditions and is no other way out. What we can do is reduce this and prolong the extreme damage for some more time. We can also use some helpful indoor plants such as snake plant, areca palms, bamboos and money plants to reduce indoor pollutants.

Acid drainage, A to Z level damages is some of the damages that human kind has already done. Our future generations have to live with that even if they don't like it. We should stop polluting at alarming rate and reduce as much as we can. Otherwise our future generations will have bio-uniforms that would protect them from harmful chemicals. They have to wear them always to survive from every unwanted chemical. They have to wear masks to escape every air pollutant. Additional they have to carry oxygen tanks to breathe pure oxygen. They will have to wear radiation protection gears to shield radiation from gadgets. They will have to attach a water tank with filtration unit to drink water. Basically they would

have to live like an astronaut in our own GREEN PLANET MOTHER EARTH. Let us postpone that as much as we can and that is the main objective of Modern Environmentalism. I can feel satisfied if a person does something good and positive on environment after reading this book. Let us leave the Earth properly for the future.

Human beings have altered atmosphere (air pollution), hydrosphere (water pollution) and Lithosphere (soil and land pollution). Pharmaceutical and medicinal wastes are entering water bodies without treatment and may be transported through the drinking water. Humans are exposed to noise pollution and radiation through electronic devices. Humans have destroyed forests, mountains, non renewable resources, mineral sources, flora and fauna.

Figure29. A Colorful Macaw



Other species are reduced to very small numbers. Environmentalists are trying their best to create awareness. However that is comparatively small considered the level of environmental destruction. Enormous greed of human kind made

them to act irresponsibly over the past. Even in the twenty first century we could not live harmoniously, it is war all over. Some governments are killing its own human resources by selling the liquor and running government using that. Indoor air pollution where we spend most of our time is also with full of chemicals and pose severe health hazard. We have reached to a point where it cannot be reversed. What is my point and the point of modern environmentalism is that we should reduce the amount of pollutants as much as we can, try to do the positive things towards environment such as planting trees and postpone the severity of the environmental damage we have done. This effort should come from individuals such as you, me and all others. Hope and pray that our children can survive the damage we have caused and may be they can find reversible solution to the damage we have caused.

Finally, on positive note, still there are wonderful natural environmental areas, ecosystems, flora and fauna to watch and enjoy. Let us help to conserve, preserve and protect for the future generations to come. That's the key objective of Modern Environmentalism. I promise that I will be contributing towards the goal of Modern Environmentalism.

Figure30. A Passionate Environmentalist

