BEWARE OF INVISIBLE ADDITIVES AND CONTAMINANTS IN YOUR DAILY INTAKE OF FOOD AND WATER

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There are more than sixty million organic and inorganic substances documented by the registries of the European and American Chemical Societies. Daily, twelve to fifteen thousand chemical products are introduced to the market. Worldwide, more than fifty million chemicals are commercially available, but less than 1 % of them are inventoried and regulated. Some of these chemical compounds extend well beyond the use for which they were originally intended. Many seep into the soil, enter the air, rivers and seas. Chemicals that have not been considered lethal contaminants such as nickel cadmium batteries in cellphones, computer laptops, CFL bulbs, pharmaceuticals, beauty care products, house hold detergents, rat poison and insect bait are increasingly polluting water reservoirs and the wider environment.

Humans as well as fragile eco-systems are being continuously exposed to these invisible contaminants. How extensive is the problem and what kind of threat does it pose to our health and ecosystems? Irrigation systems have been given the utmost importance since the time when Kings ruled Sri Lanka, and is still a priority as irrigation is essential for agricultural production. However it is through these irrigation systems that many harmful contaminants enter agricultural produce. The agricultural revolution within the last 50 years and it's results have had a big impact on Sri Lankan agriculture. Farmers are prescribed to increase their yields and become more productive by agricultural experts, who emphasize on "yield per unit area". This can only be achieved through the abundant usage of artificial manure, pesticides and weedicides. These artificial manure, pesticides and weedicides are poisoning humans, animals useful insects and bacteria in the environment. The cultivation of traditional Sri Lankan rice varieties on the other hand have been largely discouraged and therefore abandoned as they are not genetically capable of high yields, and do not require any artificial fertilizer or chemicals. It is reported that some farmers in the North Central province are suffering from kidney and liver infections by drinking water contaminated with Arsenic. These sicknesses are new sicknesses to farmers. The cause is the curse of the Harber - Bosch process which gave rise to the use of artificial fertilizer. With the ever increasing population and more mouths to feed, countries such as Sri Lanka have had to run behind higher yields through the increasing use of chemicals which contaminate the soil and the water table. How arsenic contamination has come about in these provinces is still a debate among medical experts, scientists and policy makers. The data below gives an indication of the dangerous levels of Arsenic present in fertilizer, humans, and plants.

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Table 1 : Arsenic in organs from deceased CKDu patients from the study area.

Sample	Total Arsenic content (µg/kg)		
	Previous value recorded from normal individuals*	CKDu patients	
		Lowest value	Highest value
Large Intestine	20	189.5±25.6	292.3±50.2
Rectum	20	283.4±34.3	301.5±60.3
Liver	30	264.9±45.8	95.8±40.1
Thyroid	40	187.2±44.6	234.1±35.3
Spleen	20	255.6±65.5	273.6±33.9
Kidney	30	213.5±37.1	275.3±45.8

Table 2 : Arsenic content in fertilizers used in the study area

Sample	No. of samples	Total Arsenic content (µg/kg)
Triple super phosphate - Anuradhapura	08	4253±25
Triple super phosphate - Padaviya	06	25494±438
Triple super phosphate - Colombo	10	3587±76.8
Yara Mila Complex (granular fertilizer)	04	1489±91
Murate of potash	06	120.5±19.6
Vegetable fertilizer	05	1475.4±104.2
Flower fertilizer	03	1806.3±218.8
Vegetable fertilizer	06	747.16±68.3
Purple granular fertilizer	04	1646.9±52.7
Blue granular fertilizer	04	1128.5±79.55
Unipower super N	04	504.77±42.2
Krista K44	04	128.15±15.8

Table 3: Arsenic content in plants collected from CKDu affected areas

Name of the Plant	Total Arsenic content(µg/kg)
Nelumbo (Flower)	1101±10.2
Calotropis gigantean (Wara leaves)	80.5±2.1
Asteracantha longifolia (Ikiriya)	5.55±0.1
Calotropis giganteam (Wara bark)	*157.6±1.4*
Eichhornia crassipes	553.5±2.4
Marsilea hirsuta	80±1.0
Ocimum sanctum (Maduruthala)	ND
Syzygium cumini (Dan) *Root*	17.85±0.6
Cynodon dectylon (A grass)	84.05±1.1
Terminalia arjuna Bark	115±2.4
Terminalia arjuna Root	>20 mg/kg
Tamarindus indica (Siyambala) *bark*	45.05±1.0
Azdirachta indica (Kohomba) *Bark*	>20 mg/kg
Dichrostachys cinerea (Andara) *root*	ND
Schle ichera oleosa (Kon) *Root*	160.1±2.8
Fruits of shrub (unidentified)	25.15±0.8
Diospyros ebenum (Kaluwara) *leaves*	53.2±1.0
Bauhinia racemosa (Maila) *leaves*	87.0±1.3
Agada	225.5±3.1
Memecylon sp. (Kuratiya)	40.5±1.1
Pephrosia purpurea (Pila) *root*	ND
Schleichera oleosa (Kon) *Bark*	ND
Bauhinia racemosa (Maila) *bark*	ND

The New Contaminants

Our health care system has achieved high rates of life expectancy and is considered a successful and enviable model by other countries. However there is a flip side to this. There are about 15 antibiotic derivatives produced by international pharmaceutical companies and they in turn have invaded our small island in an annually increasing propensity It seems to be imminent that poisoning by antibiotics will commence sooner than expected. For example , the State Pharmaceutical Corporation alone imports Rs. 45 million worth of Paracetamol annually to be dispensed freely through the national hospitals. The public is brainwashed to take Paracetamol anytime they get fever, headaches or any other pain. The age old herbal remedies of ginger, coriander and Venivel is no longer in vogue. Our national beverage -tea has powerful natural antibiotics known as polyphenols which can effectively eradicate poisonous bacteria in our intestines. Ironically, it is the Westerners who are embracing our indigenous medicine and herbal remedies. New contaminants comprise of a wide variety of chemicals, pharmaceuticals, personal care products, pesticides and household chemicals used in our daily lives. Many of these chemicals are toxic to humans and aquatic animal species.

Amongst these chemicals, there is a large group of chemicals known as endocrine disruptors. These chemicals interfere with the hormonal system in humans and animals. These endocrine disruptors are used as the active ingredients in pharmaceuticals for protection against various forms of cancer, cardiovascular diseases, brain disorders, as well as Osteoporosis in post-menopausal women. Personal care products such as cosmetics, soaps and shampoos are also of concern. . Diabetes and heart ailment are two the most prevalent diseases in Sri Lankan with fatal consequences. There are nearly 100 deaths per day in Sri Lanka due to diabetes and heart ailments. The most commonly detected drugs in waste water include analgesics, antibiotics and cholesterol reducing drugs. How they enter the water system is easily apparent. When symptoms of such diseases are noticed by an individual. the first thing one does is to run to the government or private medical clinics in search of a consultant and not the general practitioner. A reputed consultant will have no less than 40 - 50 patients at one single channel service before he/ she moves to the next consultation clinic. The consultant takes no more than 4-5 minutes per patient. For the consultancy practice to thrive the doctor has to be results-orientated. He/She has a choice of broad based antibiotics. analgesics, anti-depressants, painkillers and so on to choose from. These are prescribed liberally to keep the patients happy and most of the time the medicines do help with the sickness. However, by the time one takes 3/4 of the prescribed medicine. the patient is cured of the symptoms and the patient thinks there is no need to take the balance which is left in their medical cupboards or in their dispensers. After some time when one thinks of clearing up all the old medicines. it goes to the dust bin and the medicine start a new journey through the garbage collection lorries of local authorities for dumping in garbage dumps. I have personally visited the Karadiyana dumping site and Nagoda dumping site. which converts waste into compost. The batteries. CFL bulbs etc comes through the conveyor and are sorted out by operators and at the end of the day they are buried within the yard. But garbage heaps full excess drugs in Aluminium foil are kept for composting. They are mixed and kept in several heaps for about 90 days while they are soaked with the leeched liquid and added water. Finally they are sifted to make compost to be sold in the market for use in home gardens. If you are not careful, very soon you will be unknowingly poisoning yourself with the above mentioned chemicals. These fertilizer brands even have certificates to say contain very high percentages of NPK, but there is no mention about the heavy metal contaminants or antibiotics. One official said it is better to broadly spread the chemicals, rather than have them concentrated in one site. I can only say let God have mercy on him.

Composting has become a lucrative business and one composter even said that he is only putting chicken droppings, piggery dung and waste from the beer industry together with the perishable waste from the market. However. all the broiler chicken and piggeries are fed with hormones. antibiotics and other chemicals to fatten them. Their droppings therefore are highly contaminated with these chemicals and if this compost is used in your vegetable garden. you are bound to get an express ticket to heaven-thanks to the bio-fertilizer. These contaminants are not easily detected and you need complicated and expensive test kits to identify them at a huge cost.

The conventional water treatment and waste water treatment plants are not designed to remove contaminants, although state of the art technology exits. The waste water works its way to the main rivers, which water is used to irrigate agricultural crops and which finally end up as your salads and vegetable curries. Most of these complex chemicals are persistent and fat soluble. They most likely last a long time in the aquatic environment accumulating in the fatty tissues of fish and other aquatic species. Experience has shown that we do not even debate until there are a large number of cases of arsenic poisoning. Many lives would have been sacrificed by then. The public have had to file law suits to prevent garbage dumps in Bloomandhal and other local authority dumps. At least in the Western Province, the waste management authority has taken responsibility for waste and some order has been brought about, but it needs to go a long way more to reach acceptable safety standards.

The Repercussions on human health and ecosystems

There is scientific evidence that many chemicals recognized as emerging contaminants may cause cancerous tumors, birth defects, development disorders and can even affect fertility and reproductive health. According to the WHO, there has been a drop in the worldwide male fertility rate and sperm count within urban populations. However, more research is needed to establish a clear link between endocrine disrupting compounds in the environment and male infertility. There are studies underway to establish whether there is a link between human obesity and the presence of endocrine disrupting compounds. Research done by world renown laboratories show that analgesic and anti-inflammatory non-steroidal drugs may be toxic to humans and animals.

Why are these emerging contaminants not been monitored

At present, there is no mention of new and emerging contaminants in the laws and regulations governing waterways and the natural environment as they are not considered priority pollutants. The testing process for waste water and drinking water excludes these contaminants, even though the technology to detect them exists. Water quality monitoring standards cover a handful of basic physical and chemical parameters such as pH, total dissolved solids, turbidity, biological and chemical oxygen demand, key indicator bacteria, total coli form, fecal coli form and entero- cocci.

Even if the technology exits it is costly and time consuming to test and remove a wide range of these complex compounds. There are also concerns that our constant exposure to antibiotics may reduce their effectiveness in combating bacterial pathogens and that a new generation of effective anti- biotics will need to be developed. It is similar to the case of the parasitic mosquito. Originally DDT was used in 1960s and when it was not effective in the late 1970s, Malathion was used, and when even was found to be ineffective new pesticides came in to being. All these chemicals are highly toxic, but mosquitoes have become immune by building resistance. It is obvious that policies, law enforcement and regulations are urgently needed to control various chemicals polluting our environment, soil and water bodies. We have to prevent the new generation of pharmaceuticals adding to the present ones already established.

The effect on developing countries.

In Sri Lanka every 2-3 months catchy new pesticide brands are made available in the market, although in effect they comprise of the same chemical compounds as the older brands. The situation is most urgent in developing countries. This is because as technology based economies grow and the standard of living improves so, too does the production and use of chemicals. Multinational companies have moved their operations from USA and Europe to Asia, where less is known about hazardous chemicals and regulations are very weak, if they exists at all. The heavy concentration of pesticides and weedicides in commercial crops have reduced the useful insects such as bees and wasps that help in pollinating flowers of fruit trees. This is why farmers say there were a lot of fruit flowers but the fruit crop is low. Some of these pesticides have made male bees impotent resulting in less fertile eggs among the bees. The question of whether we will take action before the damage is serious and perhaps irreparable is in the hands of the scientific community and policy makers.