



Water Lanka

Ionicity – a new interpretation for Chronic Kidney Disease of unknown aetiology (CKDu)

Let me thank you all for the opportunity to meet and discuss CKDu. I had many discussions with many people besides those listed in the mailing addresses, at Kelaniya University, SJP, ITI, etc., as well as agriculturalists like Dr. Chris Panabokke. I also had some opportunities to meet with farmers and others facing the CKDu problem. In the end, I have evolved my views extensively, and I want to share my present view point, after two weeks of intense study of the material, as well as the literature.

My final view is that arsenic, cadmium, fluoride, etc. all contribute, but the culprit is the excessive ionicity of the water in the affected areas. Here is a simple explanation that I gave to some interested scientists at SJP, Kelaniya and ITI.

To explain it in simple terms is easy. When you gargle your mouth with ordinary water, and with salt water, there is a difference. The salt water strips off the mucous layers from the mouth because of the ionicity of the salt water (the dielectric constant is changed and ionic and van der Waals bonds are disrupted). The whole point is the water in the Rajarata has a high ionicity due to fertiliser run off, as well as other salts, hardness etc. The salinity due to all the ionic species is what I call the ionicity...

So ionicity is not just the amount of common salt, but all the salts. When such ionically-rich water regularly enters the kidney, the glyco-lipid layers on the cell walls of the kidney cells gradually get eroded away, just as salt water

loosens mucous from the mouth. Once that happens, the kidney cells cannot do their job of discriminating between toxins and non-toxic agents since the sensor mechanisms are in the glyco-lipid layers of the cell wall (as discussed in, say, section 11.1.1 onwards in my book). So arsenic, cadmium and other toxins which are normally eliminated by the kidneys enter the cells and begin to damage the kidneys, leading to kidney disease.



The water in many parts of Sri Lanka is affected by the run-off from agriculture. According to Dr. Sarath Amasiri and other Directors of the Department of Agriculture (e.g. Panabokke) that I talked to, farmers use 5 to 10 times the optimally needed fertiliser thinking that they would get a better harvest. In reality, it gets washed off. The fertiliser contains potassium, nitrogen, and phosphate. The last one in particular lingers on in the groundwater of the Rajarata. (In the wet zone, the monsoon washes much of it away into the sea. Panabokke says that the distribution and structure of the ground water aquifers in the Rajarata are important to the distribution of CKDu there. That makes sense.)

So what we want is data for phosphate, chloride, sulphate, calcium, magnesium, potassium, nitrate, etc., i.e. all the ions to evaluate the ionicity of the water, as well as electrical conductivity data. Dr. Janitha Liyanage may have published such data.

Most people have not looked at the ionicity issue as they have been arguing about arsenic and cadmium, etc. But the medical literature contains articles showing that even when there is a slight increase in the salinity of the water used for

intravenous drips that could cause renal damage. Hyperphosphatosis is also well known. The excess phosphate from fertilisers have been so strong that, according to Dr. Kulasooriya, the lakes in the Rajarata now have new kinds of algae that did not exist in 1910, as a response to the excess phosphate concentration. According to Dr. Amarasiri, the lakes themselves will get asphyxiated due to increasing algal bloom. It is not that the fertilisers contain excess arsenic, cadmium, etc, but that people have been using fertilisers in great excess. Even vitamins become toxic if the dose is exceeded.

Dr. Sarath Amarasiri (ex-Director General of the Department of Agriculture) and I have submitted a recommendation to the government. Namely, instead of making fertiliser containing potassium, nitrogen, and phosphorus available to the market, let us allow only fertiliser containing nitrogen and potassium to be made available. If someone wants the tri-element fertiliser, then he/she should be required to get a special permit for it. Furthermore, the amounts of fertiliser made available to farmers should be strictly controlled, as used to be in the 1970s, when agricultural technicians (rather than *Gramma Sevakas*) were issuing such permits. This step will also save a large amount of money in foreign exchange for the government, as we are today putting excess fertiliser that just gets washed away to pollute our tanks and ground water.

I will write up a more detailed technical account. However, all of you are experts in various aspects of the problem, and I am sure you would be able to recognize the strengths and also the shortcomings of this idea, and add critical comments. Any such comments would be most welcome, and once again I thank you for the cordiality and opportunity to interact accorded to me during my visit, and especially for those who gave me copies of their presentations, etc.

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Scientific meetings/events held

NARA Scientific Sessions -2013 Less emphasis on water

Scientific sessions of National Aquatic Resources Research and Development Agency (NARA) were held on the 29th November 2013 at the NARA auditorium. The theme was “Fisheries and Aquatic Resources Development for a Better Quality of Life.” Thirty oral presentations were delivered at five technical sessions coupled with thirty three poster displays. A majority of extended abstracts was on aquatic organisms of economic significance. Important aspects of ornamental fish rearing, breeding and their disease prevention were highlighted in several presentations. Antibacterial activities of extracts of certain sea weeds species collected from the southwest coast and roots of *Sanguisorba officinalis*, a terrestrial plant native to the cooler regions of the Northern Hemisphere were also presented on. The presentation made on multi-spectral satellite observations on the sea surface to estimate hooking depths for tuna long lines identifying thermocline depth was fascinating. It was interesting to note the collaborative nature of research and active participation of universities in the scientific sessions

Traditional tank systems in India and Sri Lanka

The Centre for Science and Environment (CSE), New Delhi, India conducted a knowledge sharing seminar on traditional tank systems in India and Sri Lanka on November 26, 2013 at the Nagarodaya Centre (Sarvodaya) in Colombo 8. Three speakers delivered presentations on:

- Managing water crisis through traditional wisdom - experience from South India
- Traditional cascading tank systems in dry zones of Sri Lanka
- Existing policies and action plans for restoration of cascading tanks in Sri Lanka

It was followed by an open floor discussion on the way forward.

Collated Event on Urban Water Environment: Monitoring and Management

4th International Conference on Structural Engineering and Construction Management (Capacity Building for Development)

15th December 2013, Earl’s Regency Hotel, Kandy, Sri Lanka.

Issues related to urban water bodies addressed at the symposium were:

- Integrated Urban Water Supply
- Drainage and Flood Mitigation
- Climate Responsive Design
- Solid Waste Management
- Waste Dumping
- Urban Water Economics
- Society and Social Capital
- Institutions and Urban Water Governance
- Urban Planning
- Indigenous Knowledge on Urban Water Management
- Urban Ecosystems & Ecosystem Services
- Terrestrial and Aquatic Ecosystems Protection
- Water Sensitive Urban Design (WSUD)
- Sustainable Urban Drainage Systems

Less abundance of endemic fish in Mahaweli River at Minipe

A study was conducted by a group of researchers of the University of Peradeniya on the abundance of riverine fish in the Mahaweli River immediately downstream of Randenigala and Rantambe reservoirs and Loggal Oya, a right bank tributary of Mahaweli which merges with the Mahaweli near Minipe. It found a marked difference in the abundance of endemic fish in two respective habitats. The study revealed that the abundance of endemic species in the main stream of Mahaweli was significantly low compared to the Loggal Oya, except for stone sucker (*Garra ceylonensis*), the most common and abundant fish endemic

to Sri Lanka. The study further revealed that *Channa orientalis* and *Puntius kamalika* have disappeared from the studied river stretch of Mahaweli, whereas *Labeo fisherii*, a critically endangered endemic species was there in small numbers. Nevertheless, Loggal Oya will also face the same destiny very soon with the establishment of proposed mini-hydropower plants across to the tributary

Volcanic ash to control algae in Beira Lake

Recently a group of Japanese scientists proposed to add volcanic ash to the Beira Lake to control algae. The National Water Supply and Drainage Board (NWSDB) requested Water Resources Science and Technology (WRST) to check whether

- a. volcanic ash can reduce the algal density, and
- b. volcanic ash is toxic to fish in the Beira lake



Conducting very simple manipulative experiments in collaboration with the Research and Development Unit of the NWSDB, WRST showed that volcanic ash can sediment about 50% of the filamentous algae, *Spirulina*, dominating the Beira Lake, depending on the dose of volcanic ash applied. Further, volcanic ash was not toxic to tilapia, an introduced freshwater fish dominating the water body. The sedimentation mechanism of *Spirulina* and volcanic ash is to be identified by detailed analysis. Although volcanic ash contains several heavy metals (e.g., Cu, Zn, Co, Mn, Ba, Zr, Sr), their concentrations may not be sufficient enough to impose an acute toxicity on tilapia

species (*Oreochromis mossambicus*) tested. Nevertheless, ash from the Eyjafjallajokull volcano deposited dissolved iron into the North Atlantic, triggering a plankton bloom (BBC, Science and Nature, 2010). This study was unique in the sense that it was the first to undertake sampling at sea of volcanic ash deposition and the chemical and biological effects in the surface ocean according to lead scientist Eric Achterberg from the National Oceanography Centre, Southampton, UK.

Journal of Water Resources Science and Technology -Online

Water Resources Science and Technology (WRST) will publish "The Journal of Water Resources and Technology" (JWRST) online. It publishes articles, all aspects of surface and groundwater and coastal water resources, in particular their nature and behaviour, uses and services, status and impacts. Articles may be research papers, short communications, and synthesis and review papers. All articles submitted will be subjected for peer review by two or more subject specialists prior to acceptance. No responsibility is assumed by the WRST for the statements and opinions expressed by the contributors to the journal. It is anticipated to release the first issue of Volume 1 in June 2014. For further details visit www.wrst.info.

Five Fellowships for M. Phil. Degree in Integrated Water Resources Management at University of Peradeniya

IDRC - Canada is offering five fellowships to follow M.Phil degrees in Integrated Water Resources Management (IWRM) at the Postgraduate Institute of Agriculture, University of Peradeniya.

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Working Group on Asian Inland Waters International Society of Limnology (SIL)

The International Society of Limnologists (SIL) has appointed the following scientists as the members of the working group on Asian Inland Waters:

Prof. Y. Rangareddy (India), Prof. A.P. Sharma (India), Prof. R.K. Sinha (India), Dr Malavika Chauhan (India), Prof. T.V. Ramachandra (India), Prof. Prakash Nautiyal (India). Prof. M. Arunachalam (India), Prof. Subodh Sharma (Nepal), Dr Bishnu P. Bhandari (Nepal), Prof. Reginald Victor (Oman), Prof. J. Liu (China), Prof. David Dudgeon (Hong Kong, SAR), Dr R.D.S. Papa (Philippines), Prof. Mala D. Amarsinghe (Sri Lanka), Prof. E.I.L. Silva (Sri Lanka); Dr Rahat Najam (Pakistan), Dr. Jati Sharip (Malaysia), Dr R.D. Gulati (Netherlands), Prof. S.S.S. Sarma (Mexico)

(Contact Prof. E.I.L. Silva at eils.mecamp@gmail.com for further details.)

New Entrants to Aquatic Sciences Uva Wellassa University (UWU)

The 4th research symposium of Uva Wellassa University (UWU) held on 12th and 13th December 2013 at the university premises was themed under "Value Addition Towards Economic Growth and Prosperity". The chief guest of the inaugural ceremony was Professor Gamini Senanayake, Vice Chancellor of University of Ruhuna University who highlighted the importance of establishing research culture at undergraduate level.

The symposium contributed to aquatic science by presenting the final year research results of the first batch of Aquatic Resources Technology Special Degree students of the UWU. Dr. S.C. Jayamanne, Head, Animal Science, Faculty of Animal Science and Export Agriculture of UWU chaired the technical sessions on Aquatic Resource Management with three panelists; Professors Ivan Silva, Sunil Jayakody and Dr. Kumudu Gamage. Prof. Sunil Jayakody also delivered the keynote address of the

technical sessions on "Value Addition to Marine Aquatic Resources".

The student presenters highlighted the results of their research projects conducted in several fields including aquaculture, fisheries, water quality management, product development, oceanography, GIS applications, conservation and value addition to endemic fish resources, etc. The review panel commented that undergraduates did pretty well at the first attempt of their research career. WaterLanka wishes these new entrants to the field all the best.



Mini-Hydropower Plants in Mahaweli areas

A report has to be submitted on 31st December 2013 on a study conducted by WRST Lanka on Mini-Hydropower Plants and fish fauna of Mahaweli areas, funded by International Water Management Institute (IWMI) and Mahaweli Authority of Sri Lanka (MASL).

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