

Saving weather data

IN the 13th century, the hydraulic civilization of the Rajarata (North-Central plains) of Sri Lanka collapsed. In his survey of world civilizations, Arnold Toynbee described this hydraulic system as an amazing system of water works where hill streams were tapped and their water guided into giant storage tanks from which ran channels into other large tanks. Below each tank were hundreds of little tanks. Notwithstanding occasional disruptions by internecine conflict or malaria, there was no reason the irrigation system could not be continually sustained.

The Rajarata collapse is an enigma. Its collapse is most often attributed to malaria, salinization, deterioration of the administrative service, internecine conflict and war. All these causes, though, are also factors resembling that of civilizations collapsing under climatic change. As well, the Rajarata collapse also took place in a period of dramatic climatic change – the start of the “Little Ice Age”.



Lareef Zubair discusses difficulties confronting the Sri Lankan Meteorological Service in maintaining the integrity of its data collection.

Just as in the Rajarata, now in the 21st century, there is internecine conflict, deterioration of governance, environmental degradation, ethnic conflict and war, all of which is adding up to make the society vulnerable to climate change. Just as then, there are adverse changes in temperature, rainfall, hydrology and pollution.

Global warming

The planet is warming as the coal and oil that fossilized over millennia is being burnt off. If the land gets warmer, rainfall could diminish, water could get scarce, the spread of mosquito-borne diseases is accelerated,

ecosystems could get disrupted, and even the flavour of tea could change. These trends could be gradual or they could be precipitous.

Consider what happened in 1997 to the magnificent coral reefs around Sri Lanka and throughout the tropics. 1997 was a year of the El Niño. By itself, the warming due to El Niño may not have

caused much damage. But in the context of global warming it led to ocean temperatures much higher than the historical record. The warm ocean temperatures bleached the life from the coral reefs.

This is heartbreaking in itself, but more pertinently the health and splendour of a coral reef is only one part in the health of an entire ecosystem. The death of coral reefs will then impact on the coastal communities who harvest the wealth of the sea for their livelihood, whether it be for food or fuel or tourism. It is also terrible news for coastal protection. As the sea level rises due to global warming, the first impact will be on the coast which will not even

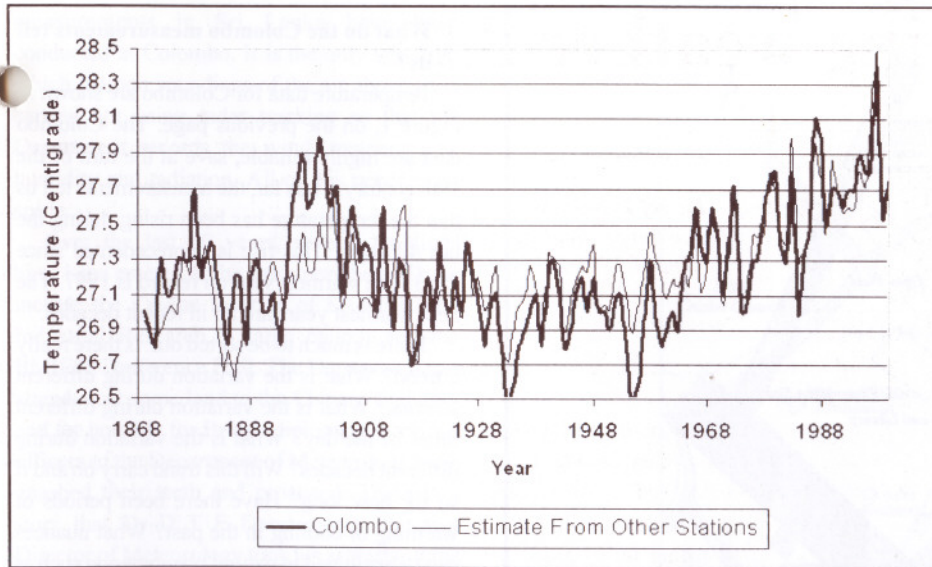


Figure 1: Annual average temperature for Colombo (thick line) and estimate for Colombo based on other stations (thin line).

ave the live coral reefs to offer the protection it enjoyed for millennia.

The gases that led to global warming have been pumped into the atmosphere by the industrialized countries. These nations have enjoyed the fruits of polluting the common atmosphere. They continue to do so with

additional help now from countries such as China and India. Some people in temperate countries argue that they would have benefits to go along with the problems of global warming, such as milder winters and improved agriculture. These countries, these people, see a much wider range of temperatures than

countries such as Sri Lanka and their ecosystems and societies have the resources for a greater resilience to climatic changes.

The damage to the tropical coral reef ecosystem in 1997 is a case in point of both the lack of tropical resilience and precipitous environmental damage due to climate change that opens up even more vulnerability.

Given all that climate impacts upon, a change in climate is an issue of national security. It should garner the same urgency and resources that goes into other matters of national security.

How can we anticipate climate change?

It is of little use to rely on planet-wide global warming projections. There is so much variability from place to place as to overwhelm global projections. What matters is what happens locally. We have to rely on ground measurements. Sri Lanka is blessed in having a long history of meteorological records. The record data in Colombo ranks as one of the finest in the tropics next to Madras.

But global warming is difficult to quantify as the temperature increases slightly, amidst much greater natural variability and errors in measurement. Therefore, precise, long and multiple measurements are essential.

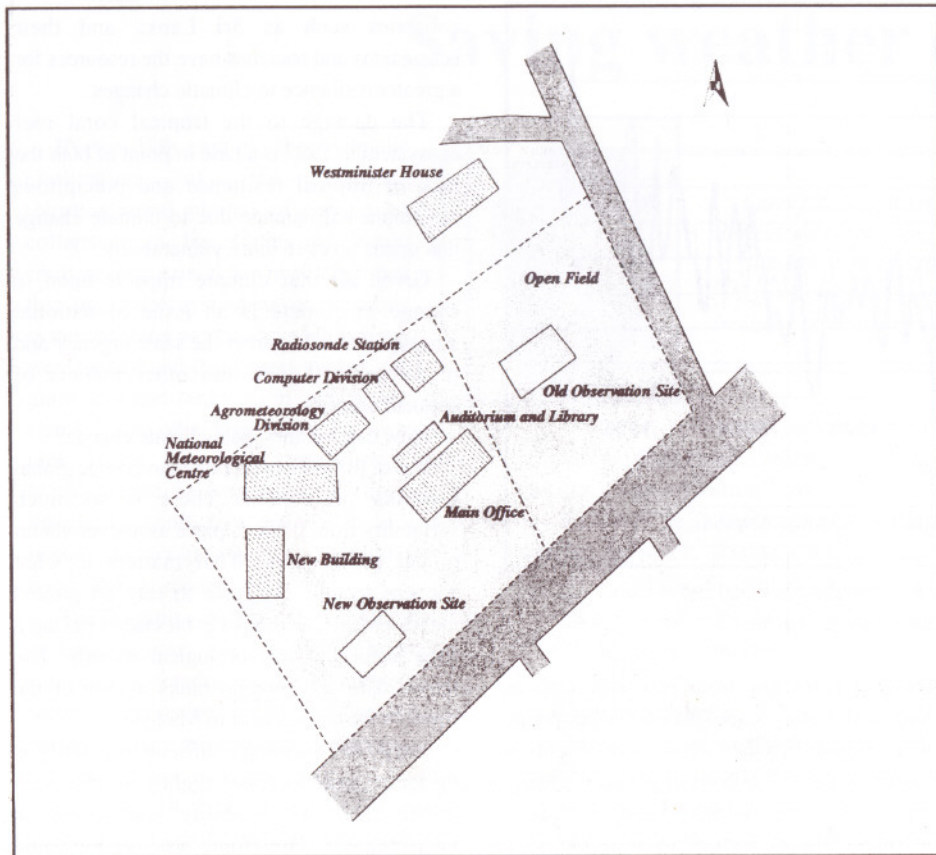


Figure 2: Location map, Department of Meteorology.

What do the Colombo measurements tell us?

Temperature data for Colombo are shown in Figure 1, on the previous page. The Colombo data are highly reliable, save at the turn of the 19th century. Thus far, the measurements tell us that the temperature has been rising during the last 40 years. This rise is unprecedented since 1853. The warmest year on record is 1997. The next warmest years are all in recent decades.

There is much to be sorted out. Is there really a trend? What is the variation during different seasons? What is the variation during different times of the day? What is the variation during different decades? Will this trend carry on and if so for how long? Have there been periods of warming or cooling in the past? What nuances can be attributed to natural phenomenon such as El Niño or volcanic eruptions? What is the contribution of atmospheric pollution? All of this by itself is complicated enough without being undermined by poor data.

Data collection and encroachment

A British Colonial military officer, Colonel Fyers, started systematic meteorological data collection at Colombo in 1852. The most careful and detailed meteorological

measurements in Sri Lanka have been conducted at Colombo. It is the only site from which balloon soundings of the air above us is carried out using radar tracking so that the Department records the wind, temperatures, humidity and radiation. All of this needs open space.

Over the last 50 years, several buildings have been erected at the site's periphery. These include the Ceylon Institute of Scientific and Industrial Research, a large church and the BMICH Conference Hall. The Department had already lost some land to the Chinese Embassy and for housing for British diplomats. Previous officers of the Department of Meteorology have gnashed their teeth and protested. There is a story that Dr D T E Dassanayake, the first Director of Meteorology took his protests all the way to the Prime Minister, Sir John Kotelewala, when a research institute for science and industry was constructed some distance away.

The ignorance of why it is so important to maintain the integrity of meteorological data collection continues now, today. Another construction is planned. Amazingly, this construction will not merely be on the periphery of the meteorological site but will encroach to the centre of the Observatory. For unpublicized

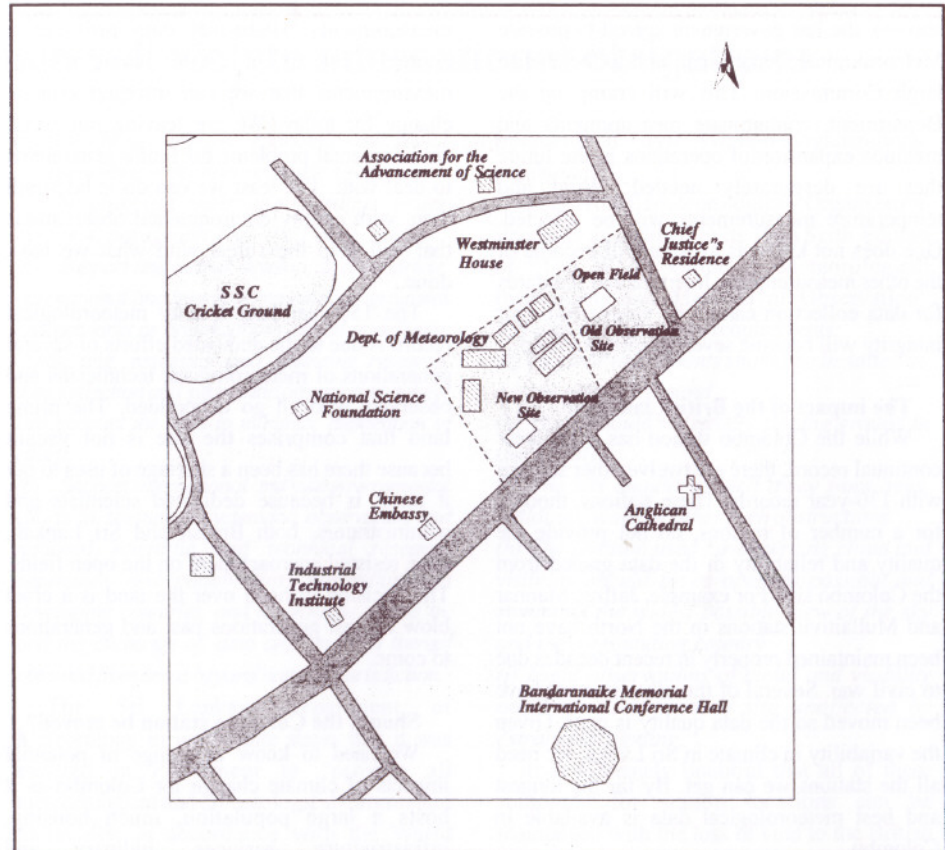


Figure 3: Area around the Department of Meteorology.

reasons, the last government agreed to provide Meteorological Department land to the British High Commission. This will cramp up the Department, contaminate measurements and preclude expansion of operations in the future that are desperately needed. Wind and temperature measurements will be affected. One does not know as to what will become of the other measurements. International standards for data collection cannot be maintained. Our integrity will become severely compromised.

The impact of the British takeover

While the Colombo station has a 150-year continual record, there are twelve other stations with 130-year records. These stations, though, for a number of reasons, do not provide the quality and reliability of the data gained from the Colombo site. For example, Jaffna, Mannar and Mullaitivu stations in the North have not been maintained properly in recent decades due to civil war. Several of the other stations have been moved so the data quality is poor. Given the variability in climate in Sri Lanka, we need all the stations we can get. By far the longest and best meteorological data is available in Colombo.

One cannot merely do with good historical

measurements. Historical data provides a context but it is with contemporary measurements that we can interpret climate change for today. We are leaving our worst environmental problems for future generations to deal with. The least we can do is bequeath them with quality environmental observations that will help them deal with what we have done.

The 150-year long quality meteorological record is due to the dedicated efforts of several generations of meteorologists, technicians and observers who all go unheralded. The prime land that comprises the site is not vacant because there has been a shortage of uses to put it to. It is because dedicated scientists and administrators, both British and Sri Lankan, have resisted encroachment on the open fields. The decision to hand over the land is a cruel blow against generations past and generations to come.

Should the Colombo station be moved?

We need to know the range of potential impacts of climate change for Colombo as it hosts a large population, much housing, infrastructure, services, industry and government. If one is to choose an area for

measurements in Colombo it is best to stay with Cinnamon Gardens in Colombo for it has remained the least urbanized. One cannot reliably distinguish the effects of urbanization from climate change which means that other sites would not give accurate information.

The Kandy station data affords lessons on the danger of relocating meteorological stations. This station was moved from Kundasale, to the British military cantonment near the Dalada Malligawa and then to Katugastota in 1953. All of that shifting has irrevocably contaminated the record prior to 1950. As a result, global databases have discarded the Kandy station measurements prior to 1950.

Few First World countries would ever contemplate moving their observatories. It is extremely unlikely that we would see Britain parcel out plots of land from the Greenwich Observatory for any purpose whatsoever. We doubt that we would ever see Greenwich Observatory land being parcelled off for the construction of foreign embassies.

The Department of Meteorology and the surrounding area is shown in Figure 3 on page 19. The British High Commissioner's residence, Westminster House, is located to the

Sri Lanka and Britain will violate international obligations

The handover of the Meteorological Department Lands in Colombo to the British High Commission in a manner detrimental to the maintenance of international standards for climate observations is in contravention of the United Nations Framework Convention on Climate Change (UNFCCC) that both Sri Lanka and the United Kingdom have signed.

Sri Lanka signed to the UNFCCC convention in June 1992. It was ratified in November 1993 and came into force in March 1994. The United Kingdom signed to the UNFCCC convention in June 1992. It was ratified in August 1993 and came into force in March 1994. The relevant clauses of this convention state that:

Article 4(g)... Promote and cooperate in scientific, technological, technical, socio-economic and other research, systematic observation and development of data archives related to the climate system and intended to further the understanding and to reduce or eliminate the remaining uncertainties regarding the causes, effects, magnitude and timing of

climate change and the economic and social consequences of various response strategies.

In carrying out their commitments under Article 4, paragraph 1(g), the Parties shall:

(a)... Support and further develop, as appropriate, international and intergovernmental programmes and networks or organizations aimed at defining, conducting, assessing and financing research, data collection and systematic observation, taking into account the need to minimize duplication of effort;

(b)... Support international and intergovernmental efforts to strengthen systematic observation and national scientific and technical research capacities and capabilities, particularly in developing countries, and to promote access to, and the exchange of, data and analyses thereof obtained from areas beyond national jurisdiction.

The Sri Lankan Department of Meteorology in its website states that it was enacted in Parliament to “provide all meteorological and climatological information nationally, in accordance with the World Meteorological Organization and the

International Civil Aviation Organizations’ regulations.”

The World Meteorological Organization standards as codified in its 1996 Sixth Edition of “The WMO Guide to Meteorological Instruments and Methods of Observation” includes the following requirements:

(a) Outdoor instruments should be installed on a level piece of ground...

(b) There should no steeply sloping ground in the vicinity...

(c) The site should be well away from trees, buildings, walls or other such obstructions. ...

(h) The position used for observing cloud and visibility should be as open as possible and command the widest possible view of the sky and the surrounding country...

(j) Night observations of cloud and visibility are best made from a site unaffected by extraneous lighting.

It is extremely doubtful that all of these standards for station locations can be maintained with the loss of land to the British High Commission.

rear of the department. The High Commission has been agitating to acquire the open field (shown separated by the dashed line) where the meteorological observations are taken. The observations have to be moved to a site that has

The Sri Lanka Meteorology, Oceanography and Hydrology Network (SLMOHN) was established in 1998. The Network initially acted as a focal point for the sharing of information between those working in the fields of climate and geophysics in Sri Lanka. The Network has expanded beyond Sri Lanka to include South Asia in particular and Asia in general. The principal activity of the Network is production of a trimesterly newsletter which is distributed to research libraries, institutes involved in meteorology, oceanography and hydrology and to researchers and other interested parties. To obtain the newsletter contact Lareef Zubair at the address given on page 25. Alternatively, the newsletter can be obtained via email at slmohn@sltnet.lk or by accessing SLMOHN through their website: www.climate.lk.

many buildings and is very close to the main thoroughfare. All of this is in violation of World Meteorological Organization guidelines.

Other needs for quality meteorological data

Understanding the complex implications of global warming is only one of the reasons for needing quality meteorological data. Other climatic impacts such as our response to El Niño, to the Great Asian Brown cloud, and our anticipation of nuclear detonations as well as many others all have to be sorted out.


Power cuts and drought have been attributed to a long-term decline in the stream flows in Sri Lanka. Is this an impact resulting from global change? The hydrological data certainly supports this assertion. Unfortunately, sand mining has contaminated the hydrological data. We need long and reliable meteorological data for water resources management.

One also needs quality meteorological data for many other purposes, including estimating air pollution, public health impacts such as asthma and dengue, in designing buildings, in designing hydro-electricity installations, wind energy installations, salt manufacture, preparing for floods and droughts, in

anticipating cyclones and aviation and military operations. The list goes on.

What is at stake?

We have the opportunity to adapt with intelligence and foresight to all that climate change poses. We can only make the most of this opportunity if we maintain the integrity and quality of our environmental data. Giving ourselves a chance to sort out the implications of climate change is more important than whatever we gained by handing over part of the Department of Meteorology to the British High Commission. There are many problems our society must confront but at the very least we cannot afford to compromise on vital observation posts of climate change.

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