

Science and National Security

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The Backdrop

The interdependence of technological advancement, export-led economic growth and consumerism in free market countries that constituted the engine of change over the last two centuries, has now taken a phenomenal downturn prompting serious security concerns at both global and national levels.

A UN study reports that the world economy had grown from USD 5 trillion to USD 30 trillion between 1950 and 2000, while the number of people living on USD 1-2 a day is expected to grow from 2 billion in 2000 to 4 billion by 2025. Further, an additional 3 billion people are expected to be added to the world's population by 2050, enhancing pressure on basic needs of food, water, sanitation, shelter and energy, while natural resources to support growth phenomena are rapidly shrinking. It is also reported that nearly 450 million people in 29 countries live in water-deficit locations, while half the world lacks adequate sanitation. The world population is also aging and moving to urban areas. It is estimated that by 2050 there will be more older people than children. It seems paradoxical that the industrial world became rich before it grew old, while the developing world is destined to grow old before it becomes rich (Glen, J.C. and Gordon, T.J., 2001).

Although a global tendency at encouraging diversity and shared ethical values was emerging, the absence of a sense of collective responsibility and global ethics has failed to stimulate the development of cohesive moral forces for the larger benefit of mankind. In this context it is a relief that the impact

of the global economic downturn has gracefully been less harsh on less developed countries like Sri Lanka.

National security concerns however, go beyond the realm of the current global recession. While global economic turbulences may exacerbate certain aspects of national problems, national security concerns are by and large country specific, and hence need internal solutions. National security is not limited to protection of independence, sovereignty and territorial integrity of the nation, but more importantly addressing the development challenges of poverty and freedom from want, social justice, inequity, inequality, availability of adequate food, clean water, health, safe shelter, sanitation and energy. In addition, as identified in a 2001 UN study, the issue of 'Environment Security', defined as "Environment Viability for Life Support", constitutes the overall security threat to mankind (Glen, J.C. and Gordon, T.J., 2001).

Threats to national security also arise from weather-related disasters, both natural



and man-made, which may result from floods, cyclones, landslides, storm surges, drought, coastal erosion, salination, sea erosion, lightning, forest fires and industrial hazards. In addition environmental phenomena such as ozone layer depletion, rise in ambient atmospheric temperature and mean sea level, environmental modifications during war situations, desertification, loss of biodiversity, contamination of air through industrial and transport related emissions, oil spills, radiological accidents, and artificial genetic pollution, combine to challenge the environmental viability for life support. These threats are either directly or indirectly associated with uncontrolled and undesirable development activities which have triggered the process of climate change.

The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), (2007) has observed that eleven of the last 12 years (1995-2006) rank among the twelve warmest years since 1850, while the global average sea level has risen since 1961 at an average rate of 1.8mm per year, and since 1993 at 3.1mm per year. The IPCC Report provides forecasts on how climate change would affect food production, water availability, health risks and disease prevalence, as well as energy demands, and cautions that “poor people and poor countries are the most vulnerable to climate change impacts because they have the least capacity to adapt”. Let us now focus attention on Sri Lanka’s own domestic concerns on national security

Water Security

Water security implies equitable distribution and accessibility to cheap and clean water, to sustain acceptable standards of food and goods production, and sanitation for all stakeholders, to ensure healthy livelihoods and prosperity. In Sri Lanka, almost 96 % of available water from the hydrological cycle is claimed to be used up in agriculture and food production, which contributes just 16 % to GDP. The estimated average rainfall in Sri Lanka varies from 1800-2000mm, giving a total volume ranging from 118,000–131,220mm³. Evapotranspiration

measurements in 70 (out of a total of 103) drainage basins had registered values of 900-1550mm per year for the wet zone, and 1200-1550mm per year in the dry zone, demonstrating that substantial water surpluses and deficits do occur across the climatic zones of Sri Lanka (Gunatilaka, A. 2008).

We are reminded (Gunatilaka, A. 2008) that security concerns in relation to water were exemplified recently by two unexpected events, which exerted intense pressure on State institutions. The first was the December 2004 Indian Ocean tsunami, which inundated the coastal zone and contaminated over 50,000 drinking water wells, affecting over 500,000 people living in the southern, southeastern and eastern coastal belt. The second was the Mavil Aru incident in the Eastern Province, where water was used as a weapon in a civil conflict, depriving farmers of irrigation water, and causing the destruction of around 30,000 acres of rice harvests.

Sri Lanka is however, privileged to be one of the few South Asian countries absolved of a major water deficit, but complacency and over estimation can precipitate our downfall during the next few decades if appropriate measures are not in place. Specific strategies and plans for rainwater harvesting, storage and conservation, recycling and reuse, desalination, enhancing irrigation efficiency, developing drought resistant as well as low water-use food and commercial crops, protection of river basins and critical watersheds, and finally ensuring integrated water resource management, are some of

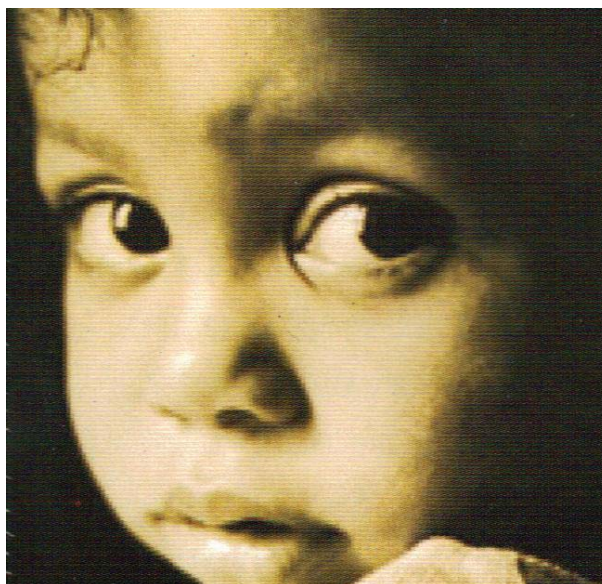


the measures recommended to prevent Sri Lanka from becoming a water deficit nation. Nevertheless, issues such as high fluoride levels in ground water and other contaminants need urgent remedial measures. It is a relief that Sri Lanka is considered to be 'on track' to achieve the targets set by the United Nations Millennium Development Goals (MDG's) for 2015, in respect of sustainable access to Safe Drinking Water and Basic Sanitation (UNDP MDG Country Report, 2005).

Water security also implies the protection of the hydropower reservoirs, dam sites, and water tanks in the context of changing geological conditions and tectonic movements; monitoring the main water intake and pump stations against salt intrusion (such as at Ambatale on the Kelani Ganga); and protecting the dry zone reservoirs and canal network. None of these have adequate early warning systems, while the potential threat to life and property of these from natural, human, and terrorism induced disasters, justify high standards of maintenance and constant vigilance. A World Bank funded study during 2000 on dam safety and vulnerability of 32 reservoirs, had revealed that 4 dams were at high risk, 10 at medium risk, and the others needed intensified maintenance to contain risk conditions. It may be relevant to note that the Tritium laboratory established at the Atomic Energy Authority (AEA), with technical assistance from the International Atomic Energy Agency (IAEA), has already shown its usefulness in detecting possible leakages, seepages and rates of sedimentation at Samanalawewa, Victoria, Randenigala and Kukule Ganga Projects (Pers. Comm. D.G.L. Wickremanayake, AEA, 2008)

Poverty and Freedom from Hunger and Malnutrition

Presently, the most pressing security concern is poverty and freedom from malnutrition. Hunger has not been of serious concern in Sri Lanka, as prevalence of underweight in children under 5 years of age (an indicator for monitoring), has been declining significantly from 37.7 % in 1993, and is



expected to be under 12 % by 2015, which is well below the target set for achieving the MDG for hunger (Dept. of Census and Statistics, 2006). However, malnutrition continues to remain a serious problem. The proportion of the country's population living below the "National Poverty Line" had declined from 26.1 in 1990 to 22.7 in 2002, while the proportion of population below minimum level of dietary energy consumption had increased from 50.9 in 1990 to 51.3 in 2002. According to the UNDP (2005) Country Report on Millennium Development Goals, Sri Lanka is unfortunately not likely to achieve the 2015 targets set for poverty reduction and malnutrition.

Sri Lanka is known world over as a country that provides the most comprehensive social security system in South Asia. By investing a significant share of public expenditure, amounting to about 4 % of GDP in free education and health services, Sri Lanka has achieved standards in literacy and wellbeing comparable to some of the highly developed countries. In addition schemes such as *Samurdhi*, *Pubudamu Wellasa*, *Rajarata Navodaya*, *Deyata Sevena*, *Gamata thaakshanya*, *Neganabiru Navodaya* etc, as well as the establishment of *Vidatha* resource centres to stimulate technology transfer, Sri Lanka has strived to strengthen the rural economy, and thereby reduce the gap between the rich and the poor. These social support schemes need to be carefully monitored and expanded to ensure that the most deserving and marginalized communities are brought into the mainstream of economic activity.

Food Security

Linked with poverty is the critical issue of food security which implies food availability at affordable prices. Despite massive global inputs into scientific and technological research on agriculture, food prices in 2008 continued to rise to dizzy heights, where poor countries and poor people could ill afford to sustain basic levels of nutrition.

Food security had been addressed for the first time

at the 1996 Food Summit held in Rome. Subsequently, FAO initiated the Global Food Crisis Summit in 2008, which resulted in a consensus statement to awaken the international community to marshal aid to those countries severely affected by soaring food prices (Balawala, C. and Abhayagunaratne, R 2008). Further, studies generated by UN have constantly reported that agricultural subsidies of rich countries have been detrimental to the food production sector in developing countries. While it is easy to blame the relevant authorities of mismanagement of agricultural development, the ideology of looking only at self-sufficiency while ignoring fair returns to the rural farmer has enhanced poverty and hence of a food crisis.



Rice as Sri Lanka's staple food has been the centre of attraction in R & D during the period 1960 to 1980. During this period, against the backdrop of a severe economic crisis and the consequent restrictions on imports of many items including basic food items, Sri Lanka's scientific community, especially the plant breeders, responded magnificently to generate high yielding varieties of rice as well as field crops, some of which were then considered to be among the best in South Asia. In rice for instance, the phased Coordinated Rice Varietal Trials (CRVT) conducted by the Department of Agriculture, resulted in increasing the yield potential of rice from 1.5 t per ha in 1952 to 2.5 t per ha by 1957, to 7.0 t per ha by 1970-73, and to a possible upper limit of 10 t per ha by 1978. In fact, through these efforts Sri Lanka was able to increase self-sufficiency in rice from a position of 45 % in the early 1950's with a population of 7 million, to 95 % by 1980 with a population of 15 million (De Silva, M.A.T. 2000). According to more recent data, the domestic supply of rice in relation to requirements had increased from 97.10 % in 2003 to 100.97 % in 2005, an indication that Sri Lanka continues to sustain a healthy food production drive (Dept. of Census and Statistics, 2006).

It is noteworthy that even before the onset of the recent global food crisis, Sri Lanka began scientific studies on meeting some of the future challenges in food production. In the late 1990's, a research project funded by the Council for Agricultural Research Policy (CARP) was initiated by a team of scientists from the Agriculture

Faculty of the University of Peradeniya and the Rice Research and Development Institute (RRDI) at Batalagoda, to study the effects of increased ambient atmospheric temperature and carbon dioxide concentration, on the productivity of rice varieties. More recently the Disaster Management Centre with UNDP assistance, launched a study on the adaptability of traditional rice varieties such as *Pachchaperumal*, and

Dabanala, as well as of some recently developed varieties of rice, to evaluate tolerance to salinity, - a condition that is likely to occur with climate change. Apart from



these studies, the government has been actively involved in a food production drive through the multi-pronged strategy of “*Api wawamu rata nagamu*”.

Scientific investigations on safe and well conceived stock piling methods for essential basic food items; development of crop varieties with low water requirements, or plants with capacity to respond to water stressed conditions; conducting foresight and intelligence studies on global food production and distribution trends to forewarn impending imbalances or scarcities in food availability; and vigilance to detect and/or counter unintentional or intentional introduction of plant life threatening pests, diseases, invasive species, genetically modified organisms, chemicals or agents professed to be soil ameliorants, are pre-requisites to counter threats to food security. An excellent example in which Science and Technology helped to resolve a major national crisis, was in the unforeseen and potentially fatal infestation of coconut palms in the early 1970's by the Philippine Leaf Miner *Promecotheca cumingii*, whose invasion from nowhere threatened to wipe out one of Sri Lanka's economically viable traditional industries. The then government amidst widespread public outcry, declared a State of National Disaster, and sought the country's entomological talent to step in with vigour to resolve the crisis and save the industry. Fortunately, just 2 years after its first appearance, the infestation was brought under control through an elegantly phased biological control programme developed by these scientists. Whether this infestation was through an unintentional or intentional introduction of a devastating pest has remained a mystery.

Energy Security

Parallel with the food crisis, arose an unforeseen concern to energy security, caused largely by a steep escalation of petroleum prices in the international market. Since Sri Lanka has to depend on fossil fuels to maintain the vital transport sector, resolution of this crisis



is beyond the realm of the government. Although the potential for substitution of fossil fuel with bio-fuels is a possibility, it is most unlikely that a small agriculture-dependent country like Sri Lanka could compromise the food production capability of its land resource for bio-fuel production. On the other hand, if Sri Lanka is fortunate enough to strike oil in the Mannar Basin, where exploration work commenced in 2007, the country would be spared of a fossil fuel crisis in the future.

Sri Lanka however, is not likely to be excessively troubled by a shortfall in electrical energy. Despite persistent objections by environmentalist and stakeholders with other interests, which backtracked by nearly two decades the implementation of two vital power generation schemes, namely the Upper Kotmale Hydropower Project (150MW), and Phase I of the Norochcholai Coal Power Plant (300MW), an emphatic political decision by the present government resulted in their implementation. Apart from these projects, a Combined Cycle Power Plant at Kerawalapitiya (300MW), and several mini- and micro hydro power plants, as well as small scale power generation units with renewable sources (such as dendro-, solar, wind, wave energy etc.) could help Sri Lanka mitigate a shortfall in energy.

Security in Healthcare

Sri Lanka's security in healthcare has been consistently considered to be well managed even from a global perspective. This was very well demonstrated recently by the manner in which the Health Sector responded in preventing any disastrous vector borne or water borne epidemics in the aftermath of the Indian Ocean Tsunami, when fresh water sources along the southern, south-eastern, and eastern coastal zones became extensively polluted. In fact Sri Lanka has been widely cited as an example of a low income country that has achieved remarkable progress in reducing the infant mortality and maternal mortality ratios, which are currently considered to be comparable with some of the developed countries. Sri Lanka is also rated as a

country of “Low Level HIV Epidemic” according to the UNAIDS classification, and in all these aspects Sri Lanka is reported to be on track in achieving the relevant MDG targets by 2015 (UNDP, 2005). However, the prevalence of environment related hazards such as high incidences of kidney failure in the North Central Province, for which no remedial measure has so far been found, is a matter of deep concern, and must be resolved speedily through a multi-disciplinary investigation.

National Security from Weather-Related Hazards

In recent years, Sri Lanka has been experiencing on a more frequent basis, threats to national security from natural as well as man-made weather related disasters. Among these, the unforeseen December 2004 tsunami was the most devastating natural disaster that the country had ever faced. National security from such hazardous events has been the subject of serious deliberations in recent times. The responsibility of early warning of such weather related hazards is now vested with the Department of Meteorology, which is being equipped with modern instruments to provide real time alerts. The setting up of seismographic and real time sea-level monitoring networks with the necessary infrastructure and expertise for data processing and modeling of tsunami scenarios is costly, and requires time. However, considering the urgency of this requirement, the current tsunami warning centres located in Hawaii and Tokyo, have agreed to provide an Indian Ocean Tsunami Advisory Service to the Meteorology Department, which has established within itself an Interim Tsunami Warning Centre (Pers. Comm. Dharmaratne, G.H.P., Meteorology Department, 2008).



In the meantime, with the enactment of the Sri Lanka Disaster Management Act No: 13 of 2005, an inter-ministerial National Council for Disaster Management for advisory purposes, and the Disaster Management Centre (DMC) as the lead operational agency were set up. The DMC has already drafted the National Disaster Management Policy to ensure a uniform widely accepted framework for risk reduction in respect of all types of disasters, which will be respected by all citizens of Sri Lanka (Ministry of Disaster Management and Human Rights, 2008).

Radiology and Nuclear Emergency Threats

The Disaster Management Act also empowers the AEA to establish plans for effective and rapid response to any radiological emergencies and impacts of nuclear reactor accidents in neighbouring countries. A National Radiological and Nuclear Emergency Management Plan have been included in the road map for disaster risk management, prepared by the Ministry of Disaster Management and Human Rights



in 2005. In the meantime IAEA is assisting the AEA through a technical cooperation programme to establish an early warning system for nuclear accidents, and for monitoring of environmental radiation. This programme which is due to be completed in 2011 includes, a) enhancing capabilities for development of baseline environmental radioactivity levels, b) establishment of an early warning system involving online radiation monitoring, and c) development of protocols to determine protective actions and intervention levels. This programme will initially cover the districts of Jaffna, Manner, Trincomalee and Colombo, as well as the Southern Province (Pers. Comm. Wickremanayake, D.G.L., AEA, 2008).

National Security from Fear and Crime

In recent times security from fear and crime has been the subject of much discussion. In the years 2005 and 2006, out of approximately 60,000 crimes reported each year, in about a third of the cases the accused have not been apprehended, and about 60 % of cases are pending, while successful convictions have been only in about 3.6 % of the cases. This is a serious indictment on the country's public security, and law and order situation, and stresses the need to have a law enforcing system based more on evidence derived from forensic science (Pers. Comm. Ratnasiri, J., 2008).

In this context it must also be noted that the Ministry of Defense, Public Security, Law and Order has developed a country-wide communication and information dissemination facility using mobile and radio telecommunication systems. This public desk facility can transmit messages, especially those involving crime and other emergency situations to all police stations almost simultaneously, so so that prompt action could be taken on a country – wide basis (Mudalige, J. 2007).

Threats from the Use of Weapons of Mass Destruction

Although Sri Lanka has so far not been seriously affected by weapons of mass destruction such as those of nuclear, chemical and biological origin, there is a dire need for vigilance against such forms of weapons, for which international assistance and expertise will be required especially into intelligence information collection and analysis. Sri Lanka has already established links with the Organization for Prohibition of Chemical Weapons under the Convention on Chemical Weapons, which has arranged to train personnel on nuclear,

chemical and biological weapons. It has however, been pointed out that to ensure security from crime, fear, and use of destructive weapons, there is a dire need for exchange and sharing of information on a national scale through a 'National Information Sharing Framework', with information provided on a spatial and temporal domain. There is also a need to ensure ready clearance to access information relating to basic forensic and crime databases. It has been suggested that a policy framework should be formulated encompassing the creation of an information exchange protocol/format through a 'National Information Super Highway' linking government, defense, research and relevant institutions on the one hand, and data classification, security audits and security clearance for individuals in information administration on the other hand. Such an information system has to operate through an apex body for compliance, and to ensure that national security is not compromised (Pers. Comm. Pieris, D., Sri Lanka Navy, 2008).

Cross Border Threats to National Security

Finally Sri Lanka as a small island economy, must also be aware and alert to the possibility of cross border threats to national security. A UN study reports that "transnational organized crime could be the world's fastest growing industry, in which the International Monetary Fund estimates as much as 5 % of the global economy is laundered through international financial systems by international networks of drug cartels, former mafia and former intelligence officers of various countries". To meet this challenge, it has been reported that already 140 nations have signed "in record time" the UN Convention Against Transnational Organized Crime. (Glen, J.C. and Gordon, T.J., 2001). Sri Lanka must therefore take necessary precautions, and be vigilant of such cross-border threats, and enlist the support and guidance under the provisions of this Convention.



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