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## Keynote Address

### Frontiers of research for the sustainability of rapid economic development envisaged in post-war Sri Lanka

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#### Introduction

All nations throughout the world are aiming at pursuing a more comfortable, healthy and decent life than what they are experiencing today. Hence, with the aim of improving quality of life, many development activities are taking place throughout the world and Sri Lanka is no exception. In the sake of these development activities, man has changed his surroundings to a great extent affecting the functioning of natural ecosystems. The Millennium Ecosystem Assessment has found that during the past five decades, man has changed the ecosystems more rapidly and extensively than in any other 50 year period of the history to meet his growing demands, which has resulted in substantial and largely irreversible loss in the diversity of life on our planet (MEA, 2005). Although these changes have contributed to some net gains in human well-being and net increase in economies, it is doubtful whether everybody in the world or in any particular country or at least in a particular region have benefited from these. However, such changes have resulted in degradation of many ecosystem services affecting all life forms on earth including humans and also increasing the poverty of many people in most parts of the world (World Factbook, 2010). MEA (2005) has predicted that degradation of ecosystem services could grow significantly worse during the first half of the 21<sup>st</sup> century, which will be a barrier in achieving the eight millennium development goals identified by the UN.

The MEA (2005) has categorized ecosystem services as provisioning, regulating, cultural and supporting. The provisioning services include the supply of food, water and other requirements for living such as timber, fiber, fuel as well as genetic resources. The regulating services include climate, floods, diseases and water quality while cultural services include research, education, recreation, aesthetics and spirituals. The supporting services include cycling of nutrients, formation of soil and primary production. Therefore, not only to achieve millennium development goals, but also to ensure the sustainability of development and survival of biota including humans, it is essential that ecosystem services are maintained at a healthy level. This is particularly important to Sri Lanka as rapid economic development is envisaged after winning a secessionist war which lasted for nearly 40 years.

### **Root causes of environmental degradation**

In order to maintain ecosystem services at a healthy level, it is necessary to identify the root causes for current environmental issues. It is well accepted that these issues have to be properly addressed and action has to be taken to reduce environmental degradation in order to sustain our development.

The most conspicuous root cause for environmental degradations has been identified as the poverty of people. In Sri Lanka, About 23% of the population lives below the poverty line, which US\$ 1.25 per day (World Factbook, 2010). Due to poverty, many people are used to settle down as well as carryout agricultural practices in marginal lands resulting in erosion, landslides, loss of biodiversity and pollution of freshwater ecosystems.

Sri Lanka has reached a per capita income of US\$ 2364 in 2010 and is aiming at US\$ 4000 mark by 2015 (DNP, 2010). However, it is questionable whether Sri Lankans can be happy with these figures of US\$ 2364 and US\$ 4000. US\$ 2364 means about Rs. 260000 per annum, which is about Rs. 22000 per month. This is the income per capita. If only one person of a family of four is the breadwinner, his monthly income should be Rs. 88000, which is above the monthly take home salary of a senior professor of our university system serving at the maximum step of his salary scale in 2010. Thus the income per person of the household of every government servant with four dependants in the family was less than the national per capita income in 2010. Therefore, even the per capita income increases, most of the money is distributed among a small group of the community. When the household income by percentage share is considered, lowest 10% of our population consumes only about 1% of our national income while the highest 10% consume about 40% (World Factbook, 2010). This is further shown by the Gini Index. At a situation of perfect equality, Gini index is 0 while in perfect inequality it is 100. There is no country in the world where Gini Index is either 0 or 100. The Gini index for Sri Lanka was 49 in 2007 and there were only 26 countries which had a value above that. In 1995, this figure was 46, which indicates that the inequality has further increased in the recent past. So where do we stand? Does anybody carry out research to address these issues and recommend mitigatory action?

Another root cause of current environmental issues is the ignorance of our politicians on the environment and their lack of commitment for environmental protection. Those who are carrying out illegal activities that cause environmental degradation are mostly the stooges of politicians of the ruling political parties who have supported them and provided funds for their political campaigns. Therefore, when politicians come into power they have to support these environment destructors in return. If these political stooges are caught for carrying out illegal activities that cause environmental degradation such as sand mining, clay mining, clearing of forests for timber etc, according to news items published in the media, most of time the politicians will intervene and get them released.

In addition, there can be other root causes also for environmental degradation which affect the sustainability of development. It is essential to identify these causes and develop strategies to mitigate them.

### **Ensuring ecosystem services**

While identifying root causes for environmental degradation and developing strategies to mitigate them successfully, research should also aim at maintaining ecosystem services at a healthy level. When the ecosystem service of provisioning is considered, research should be aimed at providing food, clean water and other requirements for living in a sustainable manner. Research should address the challenges such as increasing production and minimizing waste of food material, maintaining cleanliness of natural waters, recycling of water, development of alternative material for commonly used substances such as timber and fiber, minimizing the usage fossil fuel, development of alternative energy sources and conservation of our genetic resources. Through research we may develop our own techniques for the above and may also do necessary modifications to already developed methods to fit our requirements. By conducting research in these areas, we as a nation would be able to address the challenges such as food security and energy security better than most of other nations in the world.

Research should concentrate on maintaining regulating services of the ecosystems also. Research on developing better and efficient methods of regulating floods, disaster management, combating diseases and maintaining quality of freshwater are also essential. It is commendable that much research on diseases is carried out in Sri Lanka mainly by the academics in medical faculties of our universities.

Although a small country, it is also necessary to identify our activities that contribute to climate change and take necessary action to minimize those. As such, research should be carried out in those areas too.

In order to maintain cultural services of the ecosystems at a healthy level it is necessary to conduct research on education, aesthetics, recreation and also on spirituals. Education is essential for better health, longer life and also for better quality of life. Although 98.5% of an age cohort in Sri Lanka enter grade 1, only 89% enter the secondary school. It has also been found that about 18% of those who enter grade 1 do not achieve sufficient mastery of basic skills (Sedere, 2010). In addition, serious equity issues have also been identified in the education system. Therefore, it is necessary that research address these issues in order to mitigate them. However, there is not much research carried out in the field of education in Sri Lanka, probably due to small number of university academics in this area as there are only two Faculties and one Department of Education in the entire university system. Other areas where research is needed are aesthetics, recreation and spirituality. There is not much research carried out in Sri Lanka in these areas also. This is evident from the number of papers published in journals and the papers presented at academic symposia. For example, although at least four papers on education were presented at the last year annual sessions of Sri Lanka Association for the Advancement of Science, not a single paper in the fields of aesthetics, recreation and spirituality was presented (SLAAS, 2010). Therefore, it is necessary that research on these fields are also carried out which will help in maintaining the cultural services of ecosystems. Recent research in these fields include subjects such as aesthetics and ethical values (Stranberg, 2011), spirituality and organizational virtue (Dyck and Wong 2010) etc. Research on these lines would be very useful in the Sri Lankan context to maintain social norms and ethics. Further, research on spirituality would be very useful in addressing some of the root causes for environmental degradation that result in due to behaviour of our people.

### **Government policies**

Research in any particular country should contribute towards achieving national development goals of the government of that country. Long term policies of the Government of Sri Lanka include development of human resources in high-tech areas, attracting students to science education, creation of entrepreneur friendly research institutes and increasing advanced technology initiatives including electronics, telecommunication, biotechnology, information technology and nanotechnology (DNP, 2010). It is essential that our future research also aim at developing high end technologies in these fields.

Although, we have a documented history dating back to more than 2000 years where we boast about irrigation technology, naval architecture and sea voyages (Gunatilake, 2010), which provide ample evidence for our skills, knowledge and intelligence, when the new innovations and developments that took place in the world during the past 50 years are considered, we have missed many. For example, during the last 50 years we have missed the computer, pen drive, I-pod, lap top, e-mail, stem cell, liquid crystal display, compact disc, digital versatile disc, digital camera, DNA fingerprinting to name a few.

In our universities, we have the most intelligent group of students and teachers of a particular age cohort. Therefore, we should be able to think of new inventions which are marketable. Today, science and technology research, while addressing the issue of maintaining ecosystem functioning at a healthy level should aim also at market oriented research. These may include value addition and high tech activities that are useful in increasing food production and power generation to ensure food security and energy security. Sri Lanka has been identified as one of the 14 countries facing food emergencies and about 23% of our population is reported to be 'under nourished' (FAO, 2008). Therefore, it is essential that our research address these issues.

One of the objectives of the science, technology and innovation strategy is also to increase high tech value added exports. In order to meet this objective, the Ministry of Technology and Research has identified that our future research should concentrate on the fields of electronics, information technology, telecommunication, nano technology and biotechnology, and developing marketable products. This will help to reduce imports and also to transfer technology in a dynamic manner to generate wealth, which are some other objectives of the science, technology and innovation strategy for Sri Lanka (MTR 2010).

At the same time, while our pure scientists conduct research on value additions and development of new market oriented products, our social scientists and economists should carry out research to develop effective strategies for the distribution of benefits in an equitable manner among our people. Otherwise, as pointed out earlier, majority of our Sri Lankan nation would remain poor while the benefits of our research would be reaped by a small group of people.

### **Conclusion**

For the sustainability of rapid economic development envisaged in Sri Lanka after winning the secessionist war which lasted for nearly 40 years, it is essential that our research aim at market oriented high tech research in the fields of nanotechnology, biotechnology, telecommunication, electronics and information technology. For these, the government as well as the private sector

should provide adequate funding as in developed countries. In order to make Sri Lanka the wonder of Asia, it is absolutely necessary that the government allocate a large percentage of its budget to research than what is allocated today. It is highly commendable that the development policy framework of the Government of Sri Lanka has given high priority for science, technology and innovation.

Further, the government has the intention of making six of our universities including University of Ruhuna too, world class universities. Based on recent web ranking, five of our universities have been placed within the first 100 universities in South Asia, the University of Ruhuna being the 23<sup>rd</sup> (Webometrics, 2011). In order to get a world ranking, high quality research and international citations of research of our academics are of great importance (THE, 2011). It is our duty as university academics who are among the most intelligent group of a particular age cohort, to carry out high quality research, and get cited by international researchers as much as possible.

While conducting market oriented high tech research, it is also necessary that research address the environmental issues with the aim of minimizing environmental degradation in order to maintain the ecosystems services at a healthy level and also to share the benefits of economic development in a more equitable manner.

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