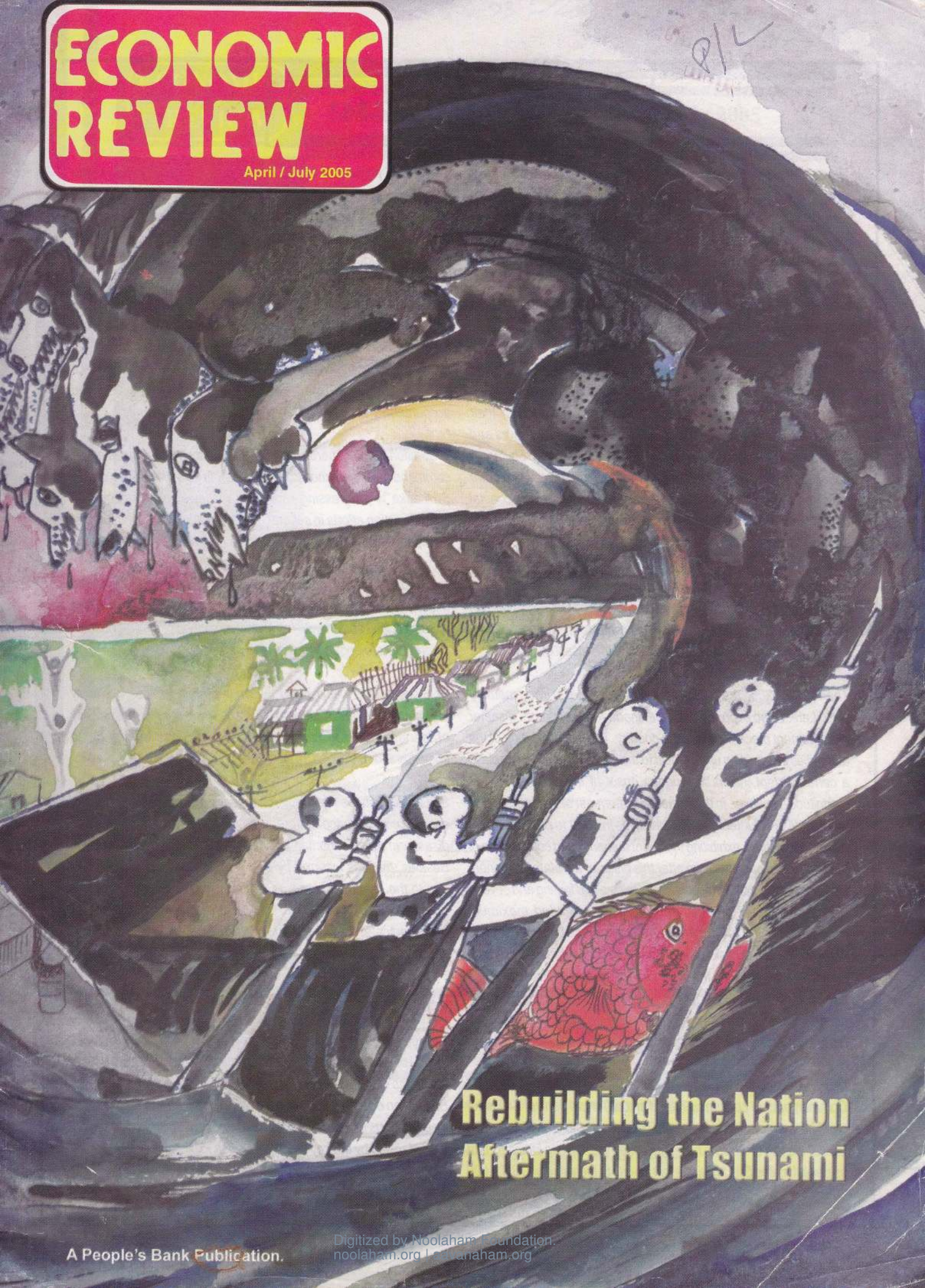


ECONOMIC REVIEW

April / July 2005



Rebuilding the Nation Aftermath of Tsunami

Overview

The catastrophic Tsunami disaster that struck the coastal areas of several South Asian and South East Asian countries including Sri Lanka on 26th December 2004 left a trail of destruction in terms of human lives, properties, livelihoods and sensitive eco systems of the affected countries on varying scales. Apart from the physical damages the severe impact of the Tsunami on the family systems in the affected areas calls for concerted efforts at several fronts so as to heal trauma suffered by thousands of people, particularly children.

In case of Sri Lanka, the most affected country after Indonesia, the severe shock and anguish caused by the deadly tsunami were so immense and it took a few days for the people to recover their senses. More than 30,000 people perished within a few hours and thousands were reported missing. A large number of buildings, houses, schools, and government offices wiped away while other buildings suffered severe damages. Apart from destroying coastal tourism infrastructure and the economically valuable coastal eco systems the tsunami displaced thousands of people and deprived of their livelihoods. In the fisheries sector alone the loss of employment is estimated to be around 100,000. Twelve of the fourteen coastal districts of the country namely, Jaffna, Kilinochchi, Mullaitivu, Trincomalee, Batticaloa, Ampara, Hambantota, Matara, Galle, Colombo and Gampaha were affected by this disaster.

The Tsunami 2004 the worst ever-natural disaster in living memory of Sri Lanka also exposed the sheer inadequacy of proper disaster management mechanisms of the country. The initial in action of the authorities in providing urgent relief to the victims was unavoidable to a certain extent, given the sudden onset of the disaster and its magnitude. However, in the immediate aftermath of this catastrophe thousands of volunteers risked their lives in order to provide urgent relief to the victims, exhibiting the latent humanity and compassion of the Sri Lankan society. Soon after this disaster the state machinery was activated to handle relief operations on a war footing and several NGOs, and other organisations as well extended maximum cooperation in the rescue and relief operations. A compassionate nation rose to the occasion and poured donations to the Rehabilitation Funds. Notwithstanding the initial shock and desperation, Sri Lanka as a nation faced the Tsunami disaster with exceptional courage and determination and the relevant authorities immediately devised short term and long-term strategies for reconstruction and rehabilitation.

Dr. P. B. Jayasundera, Secretary to the Treasury in his Independent Commemoration Lecture delivered at the Central Bank of Sri Lanka on "The Impact of the Tsunami Disaster on the Economy of Sri Lanka" the text of which is being published in this issue indicates that as per estimates Sri Lanka has lost assets to the value of US \$ 1,000

million or 5 percent of GDP. This consists of housing and private property, transport, infrastructure, fisheries, harbours, hotels, restaurants, schools, hospitals, water and electricity supplies, telecommunication etc. In this context the country is called upon to face a multitude of challenges in its massive rebuilding effort. As observed by Dr. Jayasundera these challenges include planning and implementation of reconstruction strategies, absorption capacity, management of the macro economic environment, mobilisation of resources for reconstructions, supply constraints particularly in respect of labour, materials and skills, legal issues and the governance aspects pertaining to allocation of resources, their use and accountability and stakeholder participation in development.

In addition to the generous foreign assistance all resources at our command have been mobilized towards this gigantic task. As of now Sri Lanka is progressing well in its massive rehabilitation and reconstruction efforts in several fronts simultaneously with utmost confidence and determination with the able backing and unstinted support of the political leadership along with the establishment of appropriate disaster management mechanisms in order to tackle this type of disasters in future. Large number of players both in the state and NGO sectors with the generous support of the international community are engaged in this task.

Dr. Sujeewa Amarasena, Head, Department of Paediatrics, University of Ruhuna in his contribution to this issue highlights the vulnerability of tsunami affected children and several programmes being implemented by various actors to address this issue.

Sri Lanka's fisheries sector which enjoys a considerable social and economic importance suffered heavy losses due to the tsunami disaster in terms of human lives, shelters, boats and fishing gear. Besides, the loss incurred by the Fisheries Harbour Corporation due to the damage caused its ten fully fledged fishing harbours is estimated to be around LKR 1,700 million. Mr. Tinil Fernando in his article indicates the impact of tsunami on coastal fisheries and the challenges involved in rehabilitating this sector.

In this context, Economic Review whilst solemnly remembering the thousands of Sri Lankans who lost their lives due to this calamity pays glowing tributes to thousands of other surviving victims for their stoical courage in spite of their losses. Having said that we devote the pages of this issue to record, in brief, the impact of tsunami in the Sri Lankan economy and society and highlight the challenges faced by us in terms of rebuilding the nation and how such challenges are being tackled by the key players involved in this effort.

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The Impact of the Tsunami Disaster on the Economy of Sri Lanka

Challenges for Rebuilding the Nation

(Independence commemoration lecture delivered at the Central Bank of Sri Lanka.)

Sri Lanka having spent nearly 60 years as an independent nation commanding valuable human and natural resources yet remains unsuccessful in realizing economic advancement. Many nations, which were economically far behind our country, now have bypassed us in an unprecedented pace.

Certain key factors appear to have evolved this situation. Law enforcement and regulatory agencies have lost their grip in the effective maintenance of law and order. Lethargy and dependency has shadowed the institutional framework. The public service as a whole has failed in sustaining a speedy delivery mechanism. Private sector remains passive despite a great bulk of the economy being in their hand. It is an accepted fact that development programs are often donor driven. Investment strategies have not produced modern infrastructure a nation requires to have for a rapid and equitable economic growth. People in the North and East are in dire poverty being entangled in the long drawn conflict. Several other provinces in the country remain equally poor since development is confined to limited geographical locations.

Despite the above observations, I am encouraged to note that the Tsunami disaster has proved that the government machinery is capable of successfully handling even an unforceable situation such as the Tsunami disaster that we recently experienced. The manner in which the government machinery at provincial and district levels responded to the immediate rescue and interim settlement deserves a word of appreciation, although certain shortcomings were inevitable.

Although the pre-Tsunami challenge for Sri Lanka was to reverse this weakening trends and place the economy on a pro-poor-pro growth strategy within the public-private partnership development framework, the destruction caused by the Tsunamis has added new dimensions to the country's socio-economic challenges. Larger parts of the north and east coast as well as of the south and west coast, which are the

worst affected areas by Tsunami, represents a high level of poverty and unemployment and are now confronted with multifaceted challenges of rebuilding.

Sri Lanka, is one of the two worst affected countries in the region¹ from the world's most powerful earthquake in 40 years triggered massive Tsunamis and caused extensive damage to several Asian countries on 26th December 2004. For Sri Lanka, the human loss was enormous with over 31,000 people dead, over 15,000 injured, over 5,000 still reported missing and nearly a million people displaced. The loss of assets which is estimated to have cost around US\$1,000 Million or 5 percent of GDP, consist of housing and private property, transport infrastructure, fisheries harbours, hotels, restaurants, schools, hospitals, water and electricity supplies, telecommunications etc. Considering the social dislocation and the adverse impact on the local economy from the tragic human losses as well as multi-dimensional destruction of houses and businesses, the county is now confronted with the challenge of rebuilding the affected areas and managing the welfare of affected people during the transition. The rebuilding will inevitably take time.

This poses issues relating to planning and implementation of reconstruction strategies, absorption capacity, management of the macro economic environment, mobilization of resources for reconstructions, supply constraints particularly in respect of labour, material and skills, legal issues and the governance aspects pertaining to allocation of resources, their use and accountability and stakeholder participation in development. The challenge for Sri Lanka is not only to rebuild what the country has lost, but also to manage the entire development process on top of the already high national debt, other macro economic imbalances and low income and poverty in many provinces including the Tsunami affected areas.

The Impact on the Economy

Aggregate national account figures will reveal only a marginal impact on the movement of GDP. The joint Needs Assessment done by the JBIC/ADB/World Bank reveals a downward revision in the GDP growth from 6 percent predicted before the

Dr. P.B. Jayasundera
*Secretary, Ministry of Finance & Planning
&
Secretary to the Treasury*

Tsunamis to about 5 percent. The Central Bank has also come up with a similar projection of about 5.5 percent. This downward revision is predominantly on account of the expected decline in the fish production by about 33 percent and the decline in tourist arrivals by about 30 percent. Further, claims on insurance which are expected to be in the range of Rupees 20 Billion and non-recoverable debt expected to be around Rs. 3.5 Billion, will have a burden on the performance of banking and financial institutions. The service sector may also have a setback from the destruction to water supply, electricity and telecommunications services.

Although the average growth rate projected for 2005 is revised downward to around 5 - 5.5 percent, I am quite positive that this year's growth rate will exceed 6 percent given the favourable performance in plantation agriculture, high performance in food crop and livestock sectors, the bullish growth in apparel and other industrial exports, the early recovery in tourism, the expansion in port and telecommunications related services and the boost in construction. Country's export performance as well as foreign investment remain buoyant with foreign investment this year reaching US\$500 million and exports exceeding US\$ 6 billion.

However I would like to deal with the disaggregate picture to show more serious difficulties. The fisheries sector, which is the worst affected by the Tsunamis, has suffered heavy losses. Its infrastructure base has lost heavily. Extensive damage has been caused to 10 fisheries harbours, some of which were recently developed utilizing foreign debt, and 25 anchorages have been completely destroyed or severely damaged. The damages range from loss of basic facilities such as cold-rooms, storages, electricity and drinking water, damages to break-water barriers and piers and the accumulation of debris and sediments in the harbours. To make these harbours operational will require heavy investments and would take some time.

The livelihood centered on these activities has suffered heavily. Half of the multi-day fishing boat fleet and almost the entire stock of single day fishing boats, engines, nets and other fish-

¹ Indonesia is recognized as the worst affected country with nearly 20,000 people dead. Other countries affected by the Tsunamis include India, Maldives, Seychelles, Somalia, Sri Lanka and Thailand.

ing accessories have been lost or heavily damaged, resulting in the fishing community becoming grossly unemployed. The working capital requirement of the remaining mud day boats is high, necessitating considerable help². There are around 1,300 affected fishing villages with about 124,000 fishing households and a population of around 538,000. Loss of employment is estimated to be around 100,000 in the fisheries sector.

The tourism industry which provided a livelihood to a majority of the people not only living in the physically damaged areas but also in adjoining districts have suffered large losses with a serious impact on small and medium enterprises. Apart from probably one-off losses in the early months of 2005 in foreign exchange earnings, the immediate impact on income and employment is adverse. The disruption caused to several industrial, agricultural and trading activities, particularly small and medium scale has resulted in a loss of around 100,000 jobs with virtual consequences on poverty. The loss of housing, health facilities and schools, and the consequential displacements have their own economic and social costs. So all in all, the setback to the economies in the affected districts is substantial although it may not reflect in the overall performance of the national economy. There is also a severe drawback to the post-conflict rehabilitation work in the north and east provinces with most of the housing and small infrastructure development carried out during the past three years having been destroyed.

The reconstruction program would have potential to compensate many of these losses. The reconstruction of a large number of residential houses, school buildings, roads, village and township programs would provide employment opportunities for displaced unskilled workers and thereby ease the possible incidence on poverty. The creation of employment could be quicker in owner-driven housing construction and business activities, but it is hard to assume that employment issues in fishing and tourism sectors can be easily solved in the short run.

The already implemented live hood support programs such as the SME credit scheme would also revive some of the lost activities but this process is likely to take at least 6-8 months to return to normal operational levels. The provision of fishing boats and restoration of required fisheries infrastructure will also emerge only gradually and hence the restoration of lost employment cannot be expected to be completed for at least a 8-9 months. Therefore it is clear that one major challenge in the reconstruction stage is to manage the incidence of poverty

which requires the provision of livelihood support in various forms to the affected people.

Needs Assessment

The Needs Assessment undertaken by the National Planning Department and the Task Force for Rebuilding the Nation (TAFREN) through line ministries, provincial councils and district secretaries, to develop a reconstruction and rehabilitation strategy for the Tsunami stricken areas including the conflict affected areas in the North and the East coast, provides basic information on the reconstruction challenges. On the positive side, the administrative structure at district secretaries' level provides a mechanism to gather information at grass root level and has the capacity to bring important stakeholders into the reconstruction process. There is an added advantage in the conflict-affected districts since district secretaries have been assigned important coordination work of several rehabilitation and reconstruction projects. The national level ministries and organizations provide assistance to restore damaged national infrastructure such as highways, water supplies, electricity, telecommunications, fisheries harbours, national hospitals and schools and tourism facilities. This overall organization structure shows the important role that the national and decentralised administrative network can play in the overall planning and implementation of the reconstruction activities. The leadership role of the district Secretaries in facilitating the provision of urgent relief and rehabilitation work at Provincial and District levels can be used as a vital building block, particularly with regard to promoting livelihood support, housing and schools.

Government's Needs Assessment highlighted two important requirements. First, the immediate relief and rehabilitation phase, which requires addressing the needs of about 100,000 displaced families. Their needs involve compensation for victims, provision of safety and health of women and children, food and temporary shelter, text books and uniforms for school children, basic health facilities and immediate livelihood support as well as the restoration of electricity, water, transport and road access. The overall funding requirement for this phase which may involve a 3-4 month period is estimated to cost around US\$ 200-250 Million. Second, the reconstruction and rebuilding phase which may involve a 3-5 year period for the development of housing and townships, infrastructure for human resource development, assistance for agriculture, fisheries industry and tourism and infrastructure consisting of roads, railways, telecommunications, water supplies, ports, fisheries harbours and electricity is estimated to cost around US \$ 1.8 Billion. The joint Needs Assessment done by JBIC/ADB/World Bank has estimated the recovery cost at around US \$ 1.5 Billion of which the financing requirement for the

recovery and reconstruction work in 2005 is estimated at around US \$ 500 Million. However this level of expenditure as well as the anticipated implementation period is likely to exceed, depending on the level of expenditure that has to be incurred to develop coastal resources and provide strategic investments in selected locations, to create buffer zones.

Recovery and Reconstruction Strategy

The reconstruction strategy for the tsunami affected regions should be based on several considerations. Firstly, the tsunami affected areas represent the least developed and the worst poverty stricken areas in the country. The north and the east provinces suffer from a long drawn civil war. Post conflict rehabilitation work on housing, health facilities, schools, roads and livelihood support have been in progress when the Tsunami destroyed parts of such areas. Many areas in the south reflect a high level of unemployment and obsolete infrastructure facilities. The reconstruction strategy should aim at attracting long term private investments into these areas to promote development. As such, the reconstruction opportunity should be used to develop modern infrastructure in the affected areas to overcome poverty. The modernization of the Colombo - Matara railway line, upgrading and expansion of the A2 road, the development of fisheries harbours, establishment of well planned townships and tourist resorts can be identified as flagship activities designed to transform the entire affected coastal belt into a developed zone.

Secondly, the reconstruction should not be based on the replacement cost of what is damaged but should be on the cost of required infrastructure to effect modern development and also taking into account the multifaceted risks and vulnerabilities of these areas to possible future disasters. This would involve the development of a scientifically defined buffer zone to protect the coastal environment, its resources, as well as people living in the areas. Consequently the development in these areas will be confronted with issues relating to relocation of housing settlements as well as community infrastructure. This will necessitate the identification of temporary housing and other facilities for the people. In certain districts such as Mullata, Hambantota, Kilinochchi and Mullativu, such issues may not pose severe problems since vacant land can be easily found and settlement planning is unlikely to suffer from land constraints. However in areas such as Hikkaduwa, Galle and Kalmunai, non-availability of land is likely to pose a severe constraint to settlement planning and reconstruction programmes. As such, alternative strategies may require additional capital expenditure in the reconstruction phase.

² The cost of fuel a mud day boat is estimated to be 100,000 per mud day boat.

Thirdly, the rehabilitation and reconstruction programme should aim at providing livelihood support to kick-start economic activities in the affected areas to minimize post-Tsunami transitional difficulties such as unemployment and poverty. The pre-Tsunami situation in these areas provides some perspectives to the additional burden that is cast upon the people. In the North and East, over 40,000 families were living in relief camps and more than 55,000 houses needed to be constructed. In the South, the standard of education and health remains well below the national average and unemployment remains to be the biggest provincial challenge. In this background, the implementation of micro enterprise credit schemes as well as small and medium lending programmes will help to mitigate the additional burden on the people. A need may arise to offer rural work programmes for people to engage in entire earning activities.

Fourthly, it is necessary to recognize that the re-construction phase is bound to take time considering the activities involved, ranging from temporary house construction to the development of modern and disaster resistant infrastructure including new townships with protected coastal reserves. Rebuilding is bound to be a long-term task. The planning of settlements will take a considerable period of time. In this context it is important to incentivize affected families to become key players in their own activities.

Individual ownership is key to be able to effectively drive many of such activities. The micro enterprise credit scheme, the medium term credit programme and the owner driven housing scheme will promote private initiatives in the reconstruction phase, particularly for the reconstruction of lost houses and businesses. The use of banking infrastructure to disburse funds, use of community organizations to target beneficiaries, the use of professionals to provide field advice and ensure work standards, carrying out periodic audits and regular dissemination of information would be useful to ensure good governance in the implementation process. The planning process should also take into account the non-availability of required skills and building material such as timber, sand and steel. In the context of the large skills requirement, accelerated programmes will have to be undertaken to develop required skills for construction work.

The development of community housing, housing settlements and livelihood support and the rehabilitation and reconstruction of schools and hospitals can be designed to be completed by the non-governmental sector to ensure speedy conclusion. Assistance from large donors both multilateral and bilateral can be mobilized to

assist large infrastructure projects, roads, townships, fisheries harbours and administrative infrastructure. However, the inherent weaknesses in procurement systems need to be avoided in order to ensure that implementation is done without undue delays. Towards this, it is essential that a harmonized procurement system be adopted and that transactions are done in a transparent manner adhering to best practices with timely information sharing arrangements, to avoid mistrust and misinformation being developed in the process.

Finally, the reconstruction and development of infrastructure and other community facilities should not overlook the future operational and maintenance expenditure needs of such investments. The national budget and the donor community need to take into account the required maintenance expenditure in planning future public investments to ensure sustainable development. This necessitates effective coordination of infrastructure development in the entire area.

Implementation Structure

The post-Tsunami reconstruction work has a large component of activities at decentralized level. Livelihood support, housing, community infrastructure, development of the buffer zone, provincial and feeder roads, rural and provincial schools and hospitals are essentially activities at district level which require district level participation. At the national level, infrastructure development would primarily involve highways, railways, fisheries harbours, tourist resorts, and large townships. It is also important to ensure a proper coordination between national level infrastructure development and provincial and district level activities. The implementation structure should involve consultations at various levels to ensure that policies are evolved through a consultative process and also to ensure that well-informed decisions are taken to address local needs. Further, it is important to coordinate funding arrangements and equitably resource allocations to ensure consistency in the overall development objectives of achieving a high economic growth and reducing regional income disparities and poverty.

The Macro Economic Consideration

The 3-year medium term macro economic framework embodied in the 2005 National Budget aims at sustaining a medium term growth target of 6-7 percent and a gradual moderation of the inflation rate from about 8 percent in 2005 to 5 percent in 2007³. The overall growth strategy is based on the premise that people should have access to markets for goods and services they produce and consume. Priority is given to investment in infrastructure development both at national and provincial levels, human resources and skills develop-

ment and strengthening institutional capacities and governance. The underlying medium term fiscal strategy is to achieve a revenue surplus of 3.6 percent of GDP by 2008 and phase-out domestic borrowings, while protecting public expenditure on human resource infrastructure development. The key policy objective in the balance of payments is to diversify export earnings, trade and services, improve inflows from overseas employment and foreign investments and build external reserves.

The development based on Pro-Poor-Pro-Growth strategies to reduce poverty in conflict affected areas as well as in other poverty-stricken regions receive a significant focus in government economic policies. This growth strategy expects the Central Bank to contain monetary growth at around 14.5 percent in 2005 and systematically reduce it to 12 percent by 2007, to provide economic stability.

The Tsunami rehabilitation and reconstruction expenditure is estimated to be around US\$ 1.8 Billion over a 3-5 year period. There is also about US\$ 200 Million, on account of immediate expenditure for providing livelihood support and other relief measures. Given the limitations on raising taxes or reducing expenditure, the Government, on its own, is not capable of undertaking a reconstruction effort of this scale. Hence a large donor support is necessary in order to maintain a viable medium-term macro economic environment. For instance, if a substantial volume of donor assistance is available by way of outright grants, the overall impact on the debt profile will not be affected. Similarly, long-term development assistance will not pose challenges to debt management. Although the trade deficit is expected to rise due to large scale reconstruction activities, financing of such expenditure through external assistance will enable the country to neutralize the impact on the overall external reserve movements and thereby stabilize the exchange rate. Bilateral debt relief arrangements will provide a 2-3 year fiscal space in order to accommodate additional public investments in reconstruction without exerting pressure on domestic borrowings or outward remittances on account of foreign debt servicing. In fact, such a medium term relief on foreign debt servicing will enable to reduce domestic borrowings in the National Budget which will in turn enable the Government to reduce debt and facilitate the Central Bank to reposition the stock of reserve money consistent with the monetary growth of around 15 percent in 2005 and 14 percent in 2006. This will also provide domestic counterpart funding, if necessary, without resorting to borrowings. This is conducive for the private sector to expand their investment profile including investment in Tsunami affected areas.

³ Budget 2005 - statement under the Fiscal Management (Responsibility) Act No 3 of 2003 and the medium term macro economic framework - Dr Sarath Amunugama M.P. Minister of Finance and Planning

Resource Mobilization for Rehabilitation and Reconstruction

The response to this disaster from the global community has been unprecedented. Commitments by multilateral financial institutions, governments, non-governmental organizations, the civil society and the general public from all over the world to assist the relief, rehabilitation and reconstruction process have been encouraging. The Jakarta Summit, the Geneva Summit, the Paris Club and the meetings of G7 nations have extended support for the reconstruction drive. The global community has already committed a large volume of resources in support of reconstruction and nation building activities. Within the region, India and China have pledged assistance for reconstruction on a bilateral basis. G7 nations have approved a debt moratorium and several members of the Paris Club have extended debt relief assistance in support of economic recovery. United Nations have mobilized nearly US\$ 1,000 Million and United States has committed to US\$ 950 Million for reconstruction in the affected region. Japan's commitment is around US\$ 500 Million. The European Union as well as its member nations have committed an equally large volume of resources individually and collectively. Multilateral agencies have also pledged large volume of resources for reconstruction activities in the affected countries. People as well as civil organizations and international organizations have also mobilized substantial donations. For instance various reports indicate that during the past six weeks, 2385 Million have been raised in England, through individual donations. An equal amount of money is said to have been raised through individual donations in Germany and in the United States.

As highlighted earlier, the rehabilitation and reconstruction programme requires a strategy that will mobilize funds without destabilizing the macro economic environment on the one hand and promote rapid recovery and economic development in these areas, on the other. In addition to the lead role expected from the three major donors namely the World Bank, ADB and JBIC, bilateral support for specific sector development activities would be of significant benefit to complete the reconstruction with least damage to the macro economic environment. It is equally important to provide bilateral support for trade promotion since the increased market access for Sri Lankan exports could provide a strong buffer for the balance of payments and employment creation. The Government's request from the European Union and the US for increased market access for Sri Lankan apparel exports and the bilateral support pledged for the promotion of tourism are

positive initiatives for a sustainable recovery from the setback caused by the Tsunami disaster.

Since a large number of donors including multilaterals, Governments and international non-governmental organizations are involved in providing funds, a coordinated approach towards management of the entire development process is equally important. In this background donors need to recognize the government priorities and local ownership. Very often each donor has its own strategies, with no regard to those of other donors. Each donor also tend to program their own activities on the assumption that the other donors will finance different activities. For instance, every donor has a component for livelihood support, housing, health and education. The end result is that everybody is doing everything. Moreover each one has its own accounting and procurement practices, bureaucratic systems, procedures and conditionalities. Consequently, very often, the compatibility of the reconstruction package is lost. Therefore it is necessary that all stakeholders work within the framework of the Government development programme, and its macro economic framework, so that all needs can be adequately and efficiently met, minimizing implementation delays and frustrations among affected people.

Although it may be too early to comment on the utilization of Pledge aid, given the urgency and the magnitude of the disaster, 60 days is also not too short to implement certain programmes. Donor procedures have prevented the commencement of disbursement on many such programmes although announcements and commitments have been already made. It must be recognized that the Government has already implemented a livelihood support programme, a SME credit scheme, an owner-driven housing programme and an immediate rescue and relief programme which have cost nearly Rs.13 Billion, approximately US\$ 100 Million from the National Budget. Although pledges are high nothing has yet been converted into real cash. If donor funding is commenced from the day they execute their respective agreements, it would make only very little sense towards the post-Tsunami recovery process. Retrospective financing is vital to manage the macro economic environment in the country. Leads in expenditure and lags in donor funding could be potential challenges that the government will have to manage in the reconstruction phase.

Despite a large aid pronouncement by donors, translating them into commitments and effecting actual expenditure takes time. For instance the Japanese grant US \$ 80 Million still remains unutilized. It effectively overlooks the expenditure incurred in the immediate aftermath of the disaster and does not involve retrospective financing. The procurement procedures adopted by several other donors like the World Bank to disburse funds, will

also take long time to meet expenditure expected by such assistance. The immediate response of some donors by reallocating funds from existing portfolios involve cumbersome procedures making little sense to the initial announcements made to support the recovery phase.

Substantial reconstruction work requires much larger funding support and traditional donors spend years to formulate such projects. A classic example is the development of the road sector. Donor procedures and donor conditionalities together with the capacity limits of contractors have made Sri Lankan road construction a "non-starting activity". If the funding arrangements to build the A2 Road connecting the east and south follow the same route, the economic revival in these areas will not be a reality unless the government takes a bold step to raise funding from alternate sources.

Implementation Capacity

Sri Lanka is committed to a large public investment programme with a view to providing a wide range of infrastructure facilities, developing human resources and undertaking governance and capacity building as well as post conflict rehabilitation work in the north and east provinces. The pre Tsunami aid commitment by multilateral and bilateral agencies is in excess of US \$ 3.5 Billion. The post conflict rehabilitation work in the North and East Provinces alone will cost around US \$ 500 Million. In the north and east provinces as well as in several other areas in the country, there are nearly 200 foreign funded projects in operation managed by dedicated project management teams. The annual budget has about US \$ 900 - 1,000 Million for ongoing projects.

It is well-known that the utilization of foreign aid is constrained by complex procurement practices of the donors as well as of the government. Environmental issues at the implementation stage, inadequate domestic resources in the national budget, capacity constraints of contractors, poor project designing and unrealistic and rigid conditionalities attached to such project financing. Despite having taken several measures to improve the project utilization cycle, a utilization remains to be a matter of serious concern. Even in the case of projects that have been designed for the post conflict rehabilitation work, the progress remains yet to be improved and the physical work done in the affected areas remain inadequate. In spite of a reasonably well functioning project implementation mechanism that is in place in the affected areas.

Speedy implementation would require revisions or modifications to prevailing administrative procedures, accounting and auditing systems and

the management approach. As the reconstruction process of the Tsunami stricken area is an ambitious task, an organization that would set priorities, policies and guidelines for the overall Tsunami reconstruction effort is necessary. Transforming of the Taskforce for Rebuilding the Nation (TAFREN) into a separate national secretariat with a lifespan of 3-5 years is essential to coordinate the reconstruction effort of central level projects such as major roads, railways, telecommunications, energy, national schools and teaching hospitals. At provincial level and district level, setting-up of dedicated project management units could be the driving force in the reconstruction program to ensure timely implementation and to facilitate District Secretariats. It is also necessary to provide adequate financial resources to avoid the deficiencies in counterpart funding from the national budget.

The reconstruction drive in the affected regions should not be undertaken at the cost of economic development in the rest of the country. The line ministries and agencies need to be geared towards meeting additional demands. In this background the creation of separate operational units with adequate authority would be essential to manage the rebuilding process.

Reconstruction work should not be constrained by donor conditionalities, rigid rules and regulations. Usually the donors attach various conditionalities to their programmes to include reform components in their funding arrangements. For instance, donor funding for SME credit exclude state banks and regional development banks as participating credit institutions. However if these institutions are excluded from the proposed micro credit and SME activities, such programmes will be of a limited use to the people in the affected areas as private banks can provide only limited service in such areas. The need for additional resources was stressed at the recently concluded international donor conferences. The recent announcement by the World Bank that it would be providing US\$ 150 Million for Sri Lanka's post-Tsunami reconstruction programme includes a reallocation of US \$ 75 Million from existing project profiles.

Legal and Governance Challenges

In the absence of disaster management legislation, all legal and administrative issues, which cropped up consequent to the Tsunami disaster, have been tackled under Emergency Regulations, existing legal provisions or through administrative directives and circulars. Maintenance of law and order and ensuring essential service, have been, handle through Emergency Regulations. A practical approach was adopted in the application of the law relating to burying the dead, to circumvent a second wave epidemic

situation. However there may be many gaps and unattended legal issues arising from lack of identity.

Destructions caused to properties and documents and washed away physical boundaries have given rise to serious ownership, possession, inheritance and prescription issues. Death of borrowers and destructions to mortgaged properties have also caused serious debt financing and capitalization issues. The impact on the insurance sector has aggravated this situation. Since insurance companies towards meeting Tsunami related claims adopted a lenient approach, legal issues are bound to crop-up with re-insures and company shareholders. The immediate response by the Government administration mechanism to the disaster recovery process demanded abandoning applicable legal and regulatory provisions giving rise to issues of accountability, transparency, governance, and consultations.

The formation of Task Forces under Presidential directives provided interventionist instruments to deal with situations demanding urgent solutions, involving deviations from prevailing legal, administrative financial and tender procedures entailing audit and compliance issues. Although many new statutory provisions are being considered in an attempt to find possible answers, the best approach would be to carryout a needs assessment through a consultative process and formulate a comprehensive disaster management law which will be capable of addressing the many facets involved in a disaster of this magnitude, so that the country will be geared to handle any such complex issues with least hindrance to economic activities. Policy makers and the legal luminaries need to give serious considerations to find sustainable solutions to such issues.

Economic implication of Relief & Rehabilitation Aid

Relief and rehabilitation aid comes in various forms. A large volume of relief aid has flown into the country by way of commodities largely including rice, noodles, biscuits, cooking oil, clothes including used clothes, medicine, communication equipment, computers, drinking water, shoes, water pumps and tents. The relief items have been made duty free and cleared from port and customs free of other charges. Due to capacity constraints in managing such a large inflow of relief assistance, several other regulatory requirements are also relaxed. There is a need to transit from this arrangement to a formal institutional framework.

Examination of aid consignments are necessary to prevent abuses and also to enforce regulatory requirements in terms of product standards, quarantine and environmental requirements and national security considerations. The need to ensure that non-relief commercial items are not channeled

through relief windows cannot be overlooked. Implications on local producers cannot be underestimated in the interest of relief and rehabilitation programs. For instance, when the country is harvesting its rice crop, which was not affected by the Tsunamis, there is no justification for donors to procure large quantities of rice abroad and divert to Sri Lankan refugee camps and welfare centers. The local manufactures of noodles, biscuits and garments could easily meet the donor demands of such products. Hence, except in the rescue phase, the use of streamlined procedures need not be compromised so that adverse consequences resulting from the large inflow of donations can be minimized. It should be realized that all donated commodities have been purchased from somewhere. It is in the national interest that goods, which are available in the domestic market, are purchased locally, so that related inflow of funds can compensate income losses from Tsunami affected economic activities. There are also concerns over certain relief items such as tents, which do not suit local conditions. There is only a limited use, if such goods arrive months after the relief phase during which they are mostly required.

Co-ordination of the Non Governmental Sector

With the Tsunami disaster, the presence of NGOs, the UN and its partner organizations have increased significantly. According to Central Bank statistics, Sri Lanka has so far received financial aid of Rs. 6 Billion through private donations. The government account has received only Rs. 1.5 Billion, against which the government has already implemented several measures costing over Rs. 10 Billion, about US \$ 100 Million. The international and domestic NGOs engaged in relief operations to have increased considerably. With the large aid pledges by several people and civil societies abroad, it is necessary that a coordinated effort both in terms of capital inflows as well as on development assistance is undertaken by the government. Several international NGOs now command nearly a billion US dollars for the post-Tsunami related relief and rehabilitation activities in the region. In the interest of the best outcome, it is necessary to ensure that these funds are channeled to the benefit of victims in the affected areas. Toward this, asserting how funds are raised and how they are utilized will be essential.

In addition to the macro economic concerns associated with such large capital movements, the importance of a coordinated approach led

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The Mechanism of Tsunami Waves & Tsunami Experience in Sri Lanka

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The world's most powerful earthquake in more than 40 years, measured as 9.3 on the Richter Scale, occurred deep under the Indian Ocean on December 26th, 2004, triggering massive tsunami waves and devastating coastal cities, seaside communities and holiday resorts, killing thousands of people in the South and South East Asian Countries and also in Somalia. The location of this earthquake was some 160 km (100 miles) west of Sumatra, at a depth of 30 km (18.6 miles) below mean sea level (initially reported as 10 km). This is at the active western end of the Ring of Fire, an earthquake belt that accounts for 81 percent of the world's largest earthquakes. Hardest hit were Sumatra (death toll greater than 170,000), Sri Lanka (death toll greater than 31,000), Thailand, and India. The furthest recorded death due to the tsunami occurred at Port Elizabeth in South Africa, 8000 km (5,000 miles) away from the epicentre. Anywhere from 228,000 to 310,000 people are thought to have died as a result of the tsunami, and the count is not yet complete. In Indonesian particular, 500 bodies a day were being found even in February 2005, and the count was expected to continue past June. The final final toll may never be known due to bodies having been swept out to sea. In addition, there is a possibility of more deaths to come, as a result of epidemics caused by poor sanitation in temporary relief camps where the tsunami victims are accommodated.

'Tsunami' is a Japanese word meaning 'Harbour Wave' which is developed on the event of a ship emerging a harbor. Therefore it does not denote a wave generated due to tidal forces. But in the present context tsunami is a much stronger wave capable of traveling long distances at speeds exceeding 600 kilometers per hour. Throughout the geological history of earth such incidents have occurred from time to time. Subduction of oceanic plates, impact of large meteors or volcanic activity on sea-floor may create tsunami waves that might travel to thousands of kilometers. But it should be highlighted here that every plate motion on the sea-floor is not accompanied by severe tsunami

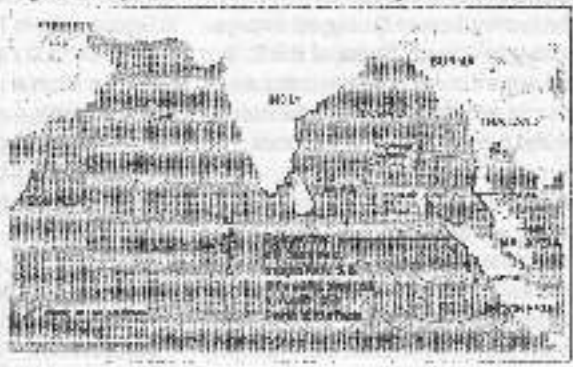
waves. It is assumed that earthquakes exceeding 7.7 on the Richter scale develops tsunami waves. Waves thus generated are extremely strong, and has the ability of traveling thousands of kilometers from its epicenter. For example the epicenter of the recent earth quake is near Sumatra, a distance of 1500 kilometers from Sri Lanka.

Even though Tsunami is a new experience for Sri Lanka's several other parts of the world has been subject to tsunami devastations from time to time. One of the oldest tsunami events recorded is related to the eruption of Krakatau volcano in 1883 in the straits between Java and Sumatra. This eruption developed a tsunami wave 40 meters tall and drowned 36,000 people on nearby coasts. These waves had even reached the shores of Sri Lanka and it has led to a sea level rise in one meter (no damages). The tallest tsunami wave ever recorded, (524 meters in height) caused by the landing of a huge avalanche in Lituya Bay was seen in Alaska in 1956. In 1800 the Chilean earth quake triggered a tsunami wave that traveled 17,000 kilometers and devastated Japan 22 hours later. The coastal villages of Nicaragua was also attacked by a tsunami wave in 1992 killing 1000 people and displacing 13 million persons. The tsunami wave which struck Sri Lanka, Tamil Nadu, Thailand, Sumatra, and Somalia in East Africa is considered as probably the second largest tsunami ever recorded.

For the majority of Sri Lanka's population the word 'Tsunami' is unknown until the outbreak of tsunami waves of 26th December 2004. Most of the Sri Lankans were unaware about the origin and nature of tsunami waves, their travel speed, and the destruction that would occur due to the impact of such waves. The recent tsunami wave which was developed due to a tectonic activity in the Indian Ocean, 250 kilometers West of Sumatra (See Figure 1) is probably the greatest

natural disaster Sri Lanka ever encountered in the recorded history. However, according to 'Mahavamsa' two thousand years ago, during the reign of King Kelanikasa, a large oceanic tidal wave has inundated the west coast of Sri Lanka. But during this period, the scientific causes of such natural disasters have not been developed and in many occasions such incidents have been treated as acts of gods to punish human beings for their misdeeds. It is estimated that the recent tsunami wave has taken the lives of 31,000 in Sri Lanka alone, and the total number of deaths for the whole tsunami affected regions of the Eastern parts of the globe is more than 1,70,000. In Sri Lanka, apart from the deaths at least million persons have been displaced and severe damages have been brought into the infra-structural facilities of the coastal regions. Since this major earth quake, geologists have detected several earthquakes, ranging from 4.0 to 6.0 on the Richter scale in the same area of the Indian Ocean close to the Indonesia archipelago. The publicity given to these aftershocks through media have sometimes created sudden panic among the coastal population. People's immediate responses to the news items, related to the latest developments on earthquakes occurring in the Indian Ocean, clearly show the state of fear

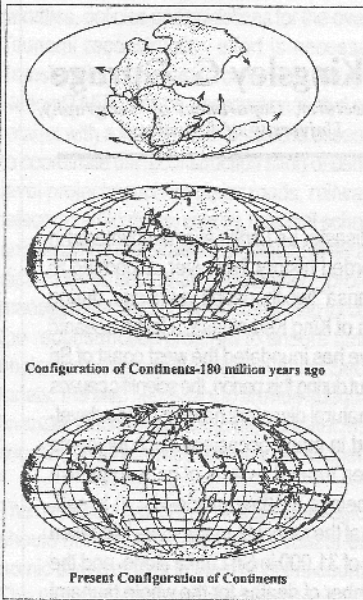
Figure 1 - Epicenter of the Sumatra Earthquake - 26-12-2004



and helplessness of the coastal dwellers. Poor knowledge on the dynamic behavior of tsunami waves is also an important factor that leads to excitement and panic, especially when people are once exposed to such devastating phenomenon. This unawareness has taken the lives of innocent people. For example many people have lost their lives by going down to

1 December 26, 2004 tsunami causing earthquake near Sumatra has been listed by scientists as the most powerful to have been seen in three times more powerful than previously thought. Thus, the quake's magnitude has been increased from 9.0 to 9.3. If this research is as is, the information will be available to the second largest tsunamis ever recorded (the rating 9.5) One quake of May 22, 1962).
Source: <http://geography.uconn.edu>

Figure 2 - Pangea-200 Millions Years ago (Arrows indicate the direction of the drift)



Configuration of Continents-180 million years ago

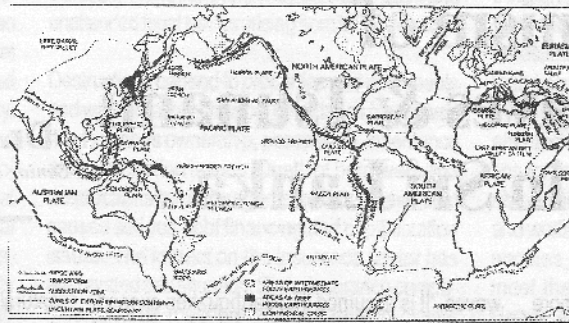
Present Configuration of Continents

the beach to see the sea bed, exposed due to the roll down and the backwash effect of water of the first tsunami wave. Soon the shore was inundated, water that accumulated began to drain back to the sea causing further damage. In the meantime the trough of the tsunami wave approached the shore, exposing a large portion of the seabed. News media has reported that before the arrival of the second wave, sea bed has been exposed to a distance around 300 meters from the shoreline. Most people didn't had, even a vague idea about the second wave that will be approaching with an enormous force equipped with a massive water mass. Since the tsunami is accompanied by several other waves the second, third or may be the fourth will cause the biggest damage. According to Shewan Daniel, of B.B.C, the second wave that devastated the costal areas of Sri Lanka, had a force equivalent to the strength generated by one million Hiroshima bombs.

Criticism with regard to this massive disaster in Sri Lanka, has been leveled against the negligence of the officials attached to the various departments dealing in "Earth sciences" in issuing early warnings about the approaching tsunami. However the unexpected tsunami devastation in Sri Lanka drew the attention of scientists as well the common people on the tsunami phenomenon.

Some of the articles published in daily news papers since the tsunami incident have concentrated on certain essential elements linked with tsunami phenomenon, such as The Richter Scale, Plate Tectonics, Earth Movements,

Figure - Major and Minor Plates



and Interior of the Earth. (Ranjith Premalal De Silva, The Island 03.01.2005, p.5, Gunatflake A, 06.01.2005, Daily News, p.8, Dissanayake C.B., 02.01.2005, Divaina, p.11) To grasp a clear picture on what is happening beneath the crust of the earth, how the earthquakes occur, how tsunami waves are triggered off, the breaking of tsunami waves, and the accompanying massive destruction, etc. it is vital to concentrate on some of the basic topics of physical geography. The present paper is an attempt to provide the reader, about the basics of plate tectonics, earthquakes and tsunami waves and it will provide a clear understanding on the mechanisms of these natural disasters

Continental Drift Vs. Plate Tectonics

"Theory of Plate Tectonics" is actually a challenging concept presented to explain the evolution of continents and oceans. Prior to the introduction of this theory several scientists have presented their views on the dynamic nature of the earth's crust. An American named Antonio Snider Pelligrini was the forerunner in explaining the similarities of the continental margins of South America and Africa. In 1858, he published a map showing South America joined to Africa, and North America joined to Europe. Later in 1910 F.B. Taylor tried to explain the distributional pattern of Caledonian and Hercenian Mountains of Europe employing the idea of wandering continents. However, in 1912 the idea of wandering continents was systematically presented by the famous German climatologist, Alfred Wegner, as the "Continental drift Theory"

According to Wegner's theory the present continents have evolved from the super continent "Pangea" that existed 300 million years ago. Pangea started to breakup about 200 million years ago and continues to date (see Figure 2). In the first instance "Pangea" broke up into two super continents, and separated from each other. The large continent drifted to the North was designated as "Laurasia" (or Angaraland) and the other continent drifted to the South was known as "Gondwanaland". The Northern continents excluding sub continent India, were formed from the

Northern super continent and the Southern continents evolved from the Southern counterpart. Forty million years ago, Indian land mass separated from Gondwanaland, drifted northwards and collided with the Asian landmass, creating the Himalayan mountain ranges.

This theory was highly debated, and was also later supported by various scientific findings, such as the

matching coastal features of continents on either sides of the South Atlantic Ocean, similar geological history of Guyana shield in Brazil and Sahara shield in West Africa, paleo climatological evidences such as Permo Carboniferous glaciation, Pleistocene glaciation, fossil records, paleo magnetic records etc.

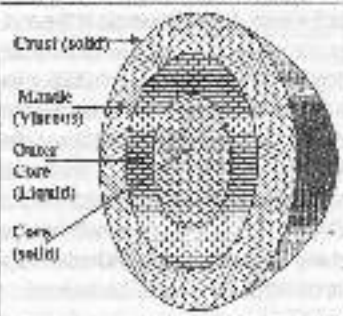
According to the theory of "Plate Tectonics" the earth surface is divided into a mosaic of rigid moving plates. There are altogether seven major plates (North American, South American, Pacific, Eurasian, Indo Australian, African and Antarctic) and thirteen minor plates. (Philippine, Bismark, Fiji, Gorda, Solomons, Cocos, Caribbean, Nazca, Adriatic, Hellenic, Turkey, Iran, Arabian, (See Figure 3). Large plates are believed, to be driven by the sub-crustal convection currents of the earth mantle, while the smaller plates trapped within the larger plates, move due to an indirect force generated by the movements of the major plates. Since the driving mechanism for the plates are provided by the convection currents that develop beneath the crust of the earth, the reader should be aware about the interior of the earth as well as this driving mechanism.

Interior of the Earth

Most of the knowledge we have acquired so far about the interior of the earth are based on indirect evidence. Specially primary (P waves) and Secondary (S waves) earthquake waves provide information about the internal properties of the earth. P waves have the ability of penetrating through solids and liquids, where as S waves do not pass through liquids. Seismographs show that S waves generated from an earth quake, travel at the speed of 4.64 kilo meters per second within the crust of the earth. As the density of rocks increase the speed of the waves also increases. It is apparent that S waves display a maximum speed of 7.2 kilo meters per second at a depth of 2800 kilo meters.

However S waves do not travel beyond 2800 kilo meters from the surface of the earth. P waves travel much faster than the S waves. But it shows variations at certain depths. Within

Figure 4 - Interior of the Earth



the surface layer of the earth it has a speed of 5.8 kilo meters per second. When it reaches the depth of 1800 miles the speed has developed to a maximum of 14.68 kilo meters per second. Beyond this limit the speed reduces to 8 kilo meters per second, and within the last 1290 kilo meters of the earth's interior once again the speed of P-waves increases to 12.8 kilo meters per second. Based on these speed variations and also considering the other physical factors that affect the speed of waves, scientists have divided the interior of the earth into four major concentric zones (see Figure-4)

The topmost layer of the earth, known as the "Crust" is a thin rigid shell covering the inner shells of the earth. The thickness of the crust varies from 12.8 to 64 kilometers. Normally the crust is thin beneath the oceans and very thick in mountain regions. This rigid shell floats on the adjoining inner shell known as the "Mantle". The mantle has a thickness of 2880 kilometers, is assumed to be in a viscous state. The driving mechanism for the Plates, i.e. the convection currents, originates within the mantle region. Outer core, is believed to be in a liquid state while the most inner portion of the earth's interior "The Core", is in a solid state.

Sub-Crustal Convection Currents

Now let us examine the physical background that leads to the creation of "Sub-Crustal Convection Currents". Scientists assume that sub-crustal convection currents originate due to two reasons. The first is the heat emitted from the hot inner parts of the earth. Most astronomers favor to explain this heat emission, by assuming, that the earth (and other planets, asteroids, etc.) evolved from a hot gaseous cloud. According to this theory 9-25 billion years ago, all the matter of the universe was concentrated in a relatively small space, and this concentration was named as a "Nebula." Extremely high pressures and temperatures within this initial concentration made it impossible for elements to exist. Instead it consisted of a gas-

eous cloud. Since all planets share their origin to this hot gaseous cloud, it should be admitted that all planets evolved as hot celestial bodies and began to cool. It is admitted that heat is still escaping from the inner parts of the planets. The crust, being the first to cool down has become a rigid shell covering the rest of the earth's inner shells. Scientists believe that the heat escaping from the interior regions of the earth provide power for the convection currents.

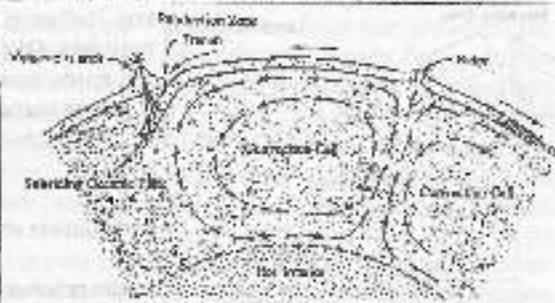
The second source of power for the formation of convection currents is supplied from the decay of radioactive elements such as Radium. Such elements usually occur in the upper parts of the mantle close to the crust of the earth. On the event of radioactive decaying these elements automatically disintegrate, releasing heat. This heat is transferred upward through convection currents. It is also observed that these currents move upwards beneath areas where the crust is thick. Similarly the currents sink beneath areas where the crust is thin. (see Figure 5) Therefore the rising currents are usually expected beneath the continents, and the sinking currents beneath the oceans. Since the rising currents move, beneath the continents parallel to the continental land mass, it exerts a force on the continent, which finally leads to a movement of the land mass.

This process has been going on throughout the earth history. Earth scientists relate the breakup of the super continent "Pangea" and the evolution of the present continents to the above process. Therefore it is now certain that plate tectonics have operated at least for the past 200 million years of earth history.

Types of Plate Movements

Let us now examine the relationship between the plate movements and the occurrence of tsunami waves. There are three types of plate movements, accompanied by specific geological results. (see Figure 6) The first type is characterized by movement of plates in opposite directions relative to a ridge axis. This motion causes the sea-floor to split and spread apart at the ridge crest. In response to this spreading magma rises to the surface along the opening fissures, and erupts as submarine lava flows, and some times as submarine volcanic centers. In most of the mid-oceanic ridges (such as Mid Atlantic Ridge) this is a common physical feature. A new sea-floor is created (this process is known as "Sea Floor Spreading") by magma which flows into the open-

Figure 5 - Sub-Crustal Convection Currents



ing created by the plate motions in opposite direction? Spreading rates have been calculated along the Mid-Atlantic Ridge. The spreading rates vary from 2-18 centimeters per year. It is also apparent that spreading rates are high near the equator, and the rate reduces towards the poles.

The second type of plate movement usually occurs along fault lines. The movement of plates in opposite directions along a fault line creates a transform fault. The third type of plate movement is towards each other and it may lead to the formation of mountains and subduction zones. For example 40 million years ago the collision of Indian plate with the Asian land mass created the Himalaya mountain ranges. Similarly, the collision of a continental plate with an oceanic plate creates a subduction zone. Deep oceanic trenches such as Mindanao, Mariana (in the Pacific Ocean) have been created due to such plate motions.

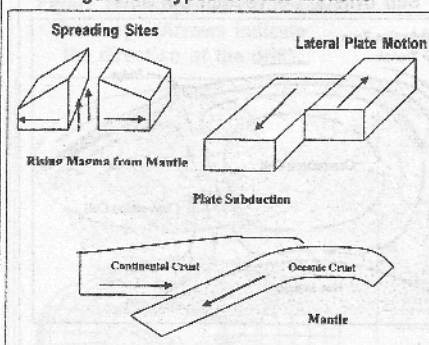
Plate motions described above create earthquakes. The intensity of the earthquakes, and the depth of the earthquakes (focus) is determined by the nature of the plate motion. For example, spreading sites are characterized by shallow earthquakes (from surface of the crust up to a depth of 60 km) or volcanic activity. Normally the collision of a continental plate and an oceanic plate leads to the formation of a subduction zone. The reason for this tendency is the relative strength of the continental crust and the oceanic crust. It is assumed that the oceanic crust is weaker than the continental crust, and when they collide with each other the oceanic crust is overridden by the continental crust. Another example is Nazca oceanic plate which is overridden by the South American Plate. A subducting oceanic plate is transformed to a viscous state as it reaches the inner parts of the mantle. Most of the deep focus earthquakes (occurrence beyond 300 km depth) occur along subduction zones.

Earth Quakes of 26th December 2004

The earth quake of 26th December 2004, originated in the Indian Ocean just north of Sumatra

² If this process is going on everywhere along the oceanic ridges, as it appears to be, then we have to admit that the earth is expanding at least for the past 200 million years of geological history. (5th ed. James W. Wadsworth) But in this sense the scientists have found out that the earth's surface has not expanded more than about 1% during the last 200 million years.

Figure 6 - Types of Plate Motions



island, off the western coast of northern Sumatra, Indonesia, was unusually large in geographical extent. It occurred due to the subduction of the Indian Oceanic plate, and it is overridden by the Burma micro plate. An estimated 1200 km (750 miles) of faultline slipped about 15 m (50 ft) along the subduction zone. The slip took place in two phases over a period of several minutes. Seismographic data indicate that the first phase involved the formation of a rupture about 400 km long and 100 km wide, located 30 km beneath the sea bed. The rupture proceeded at a speed of about 2 km/s, beginning off the coast of Aceh and proceeding north-westerly direction over about 100 seconds. A pause of about another 100 seconds took place before the rupture continued northwards towards the Andaman and Nicobar Islands.³

According to the USGS National Earthquake Information Center, a zone extending to a distance over 1000 kilometers of the earth's crust is overridden by the Burma Plate. It is believed that the Burma Plate had moved 13 meters over the subsiding Indian Plate. Since the plate movement was both vertical as well as lateral, some coastal areas may now be below sea level. Measurements using GPS (Global Positioning System) and satellite imagery are being used to determine the extent and nature of actual geophysical changes that have developed due to the earthquake and the tsunami wave.⁴

In February 2005, the British Royal Navy vessel HMS Scott surveyed the sea bed around the earthquake zone, which varies in depth between 3,300 ft and 16,500 ft West of Sumatra, using a high-resolution multi-beam sonar system. The results revealed that the earthquake had generated a huge impact on the topography of the sea bed. It had created large thrust ridges, almost 1500 meters high, which have collapsed in places to produce large landslides several miles across. One landslide consisted of a single

block of material some 100 meters high and 2 km long. The force of the displaced water was such that individual blocks of rock, weighing millions of tons apiece, were dragged as much as 10 k.m. across the sea bed. An oceanic trench several kilometers wide was also created by the earthquake.⁵

Earth Quakes and Tsunami Waves

Sudden movements of a large sea-floor area due to submarine faulting, vertical movements of the sea floor (upwards or downwards) may generate a vertical disruption of a large column of water that would finally trigger off a tsunami wave. For example, along with the collision of Indian and Burma Plates a section of the sea-bed about 1000 kilometers in length has rose up to 30 meters, and the entire water column over this area has toggled up and down, creating ocean waves. The height of such waves is normally less than a meter. But the wave length may vary from 100- 400 kilometers, depending on the scale of the earthquake. The speed of the waves depends on the bathymetric nature of the ocean floor. For example, in deep water (depths exceeding 3 kilo meters) the waves may travel at speeds of 500 to 1000 kilo meters per hour. But as the waves approach a land mass the wave speed reduces dramatically while it develop its wave height. It is estimated that in Sri Lanka 5-6 meters high waves have been built up during the recent tsunami, and perhaps even more at some places. Some times the wave height may exceed 25 meters. As the wave height increase the steepness of the wave and the tendency to break also increase dramatically, but the wave speed may reduce to few kilometers per hour, and finally the wave breaks with an enormous force. This force is strong enough to destroy anything on its path. However very little happens when waves travel in deep water. Usually an ocean wave breaks when it reaches a depth, equivalent to 1/7 of its initial wave length. This rule applies to the tsunami waves as well. But the huge amount of water it carries towards the shore prevents it from breaking gently. Instead it attacks the coastline with a tremendous power. It is apparent that coastal areas without natural barriers such as coral reefs, or natural coastal vegetation, natural sand dunes are subject to severe damages. According to the post tsunami surveys launched in Sri Lanka it is evident that severe damages have been observed where such barriers have been totally cleared or disturbed through human intervention. For example Yala Safari hotel is totally devastated, because the hotel authority has cleared the sand dune which was situated opposite the hotel, to get a clear view of the ocean. The absence of the sand dune provided easy access to the invading water masses from the sea towards the land.

All the earthquakes do not develop catastrophic tsunami waves. A good example is the earthquake, measuring to 8.7 on the Richter Scale, that occurred on the 28th of March 2005 in the same area, of the Indian Ocean. Tsunami warnings were issued around the Indian Ocean after this earthquake. However, a few hours after the quake, there were no reports of any tsunami. Scientists are still grappling with the mystery of why a large earthquake under the Indian Ocean did not produce a sizeable tsunami.

This situation reflects another interesting fact about the generation of tsunami waves. According to Brian Baptie of the British Geological Survey in Edinburgh, "It is very difficult at the moment to understand the absence of a tsunami following an earthquake of 8.7 magnitude. One possibility is that its epicenter may have been located deeper. The earthquake occurred on the 26th December 2004, which measured 9.3, resulted from a massive jolt that took place some 10 kilometres below the seabed, whereas preliminary estimates suggest that the latest earthquake was focussed on a fault zone three times deeper. This may have dissipated some of the energy before it reached the seabed, or at least caused the ground to move in such a way that it failed to displace the water column above to generate a large tsunami. A 8.7 magnitude earthquake occurring 150 miles off the coast is certainly big enough to generate a large tsunami and it was exceptionally lucky that we didn't have one. By far the most destructive tsunamis are generated from large, shallow earthquakes with an epicentre or fault line near to or on the ocean floor. They usually occur in areas where one of the Earth's tectonic plates is slipping, or subducting under another plate. One thing is certain. That is, the earth did not move on the 28th March quake in the way it did on 26th December last year when 10-metre high waves killed up to 300,000 people around the Indian Ocean."⁶

The Nature of Tsunami Devastation: Sri Lankan Experience

Deaths and Other Physical Damages

Nearly two thirds of the coastal zone of Sri Lanka were destroyed without any warning whatsoever, by the Tsunami wave of December 26th 2004. Altogether 13 districts of Sri Lanka have been devastated by these ravaging waves. Within the Indian Ocean region, hardest hit by the December 26 earthquake and tsunami wave was Indonesia, with a total of 232,732 people listed as dead or missing. The death toll, in Sri Lanka, (which was second

³ Source: <http://www.guardian.co.uk>

⁴ Source: <http://www.timesleader.com>

⁵ Source: <http://www.newscientist.com>

⁶ For further details, Visit: <http://www.nzherald.co>

hardest hit by this catastrophe), stood at 30,957, and over a million people have been rendered homeless according to the Centre for National Operations. In neighboring India, the official death toll was 16,289 with 5,640 still reported missing and feared dead. Myanmar has announced the death of 61 persons. At least 82 people were killed and another 26 were missing in the Maldives. Sixty-eight people were dead in Malaysia, most of them in Penang, according to police, while Bangladesh reported two deaths. On the east coast of Africa, 206 people were declared dead in Somalia, 10 in Tanzania and one in Kenya. (See Table 1)

Table 1
Number of Tsunami Deaths By Countries

Country	Death toll
Indonesia	232732
Sri Lanka	30,957
India	16,289
Thailand	5,368
Somalia	206
Maldives	82
Malaysia	68
Myanmar	61
Tanzania	10
Bangladesh	2
Kenya	1
Total:	265993

Source: Sunday Observer, 13th January 2005

Socio Economic Impacts of Tsunami Devastation

Apart from the deaths and the material damage witnessed along the coastal zone, island ecoo - economic base was also severely affected by the tsunami wave. Nature of the economic impact caused by the tsunami wave differs from district to district. For example, the maximum damage to tourism sector is apparent in Galle, Kalutara and Hambantota Districts. Post tsunami surveys carried out by various institutions report that 58 registered tourist hotels (out of 212 registered hotels) have been completely or partly destroyed due to the tsunami wave. It is estimated 27,000 persons within the tourism sector have lost their jobs due to this disaster, and the loss of foreign exchange is around US \$ 250 million.

Besides tourism, the tsunami wave had crippled the fishing industry also. More than 19,000 fishing boats were completely destroyed, and the loss due to the tsunami is estimated as US \$ 97 million. The tsunami impact on the fishing communities is a very serious problem, because these people have been affected at both ends. On the one hand their houses and properties have been taken away by the tsunami, and on the other hand the damage caused to the fisheries sector has created mass unemployment. It is estimated that 100,000 persons have lost their jobs due to the tsunami devastation.

Severe damages on the railway track were apparent between Kalutara and Galle. Educational sector was badly affected in Galle and Ampara Districts, while Ampara, Batticaloa

Trincomalee and Hambantota have experienced severe damages to health facilities. It is estimated that 97 government hospitals and 140 schools have been completely destroyed.

Since the tsunami devastation, several surveys have been conducted by local as well as international organizations to estimate the damage incurred. Most of these surveys were conducted

with the main purpose of providing the necessary information to the government in order to carry out rehabilitation work and also to provide aid to the tsunami victims. Apart from this, few international research teams have visited Sri Lanka to document the effects of the tsunami in a more scientific manner.

A recent study conducted by International Tsunami Survey Team on the tsunami affected areas of Sri Lanka has revealed some important facts about the relationship between the height of the tsunami wave and the nature of devastation relative to the distance from the shore. According to tsunami height information collected by the ITST it is apparent that tsunami has lost its energy as it traveled to inland areas. Water levels were usually greatest near the shoreline and have decreased to zero at the limit of tsunami penetration where all the energy of the tsunami is exhausted. The measurements of water levels near the shoreline varied from less than 3 meters to more than 10 meters. It is obvious that casualties and damage to structures were strongly related to the height of the tsunami, not only at the shoreline, but also within the inland areas. There was, however, considerable variability in wave height and the extent of damage, caused by number of factors such as the distance from the shoreline, removal of energy by drag on the bottom and breaking, orientation of the coastline, bathymetry of the ocean floor close to the shore, nature of the coast (physical features such as bays, promontories, low lying areas, etc), and nature of the vegetation cover.

Damage to Houses and other Coastal Structures

It is reported that tsunami were preceded by receding seas and huge waves which are capable of destroying anything on its path. The breaking of such waves pushes everything on its path towards in and, until the wave strength is dissipated,

Remnants of houses and other structures left behind by the tsunami were give an indication of its devastating capacity. Damage to structures from the tsunami wave was greatest where the tsunami height was at its highest. According to the ITST study, there was a zone near the coast where all structures were completely destroyed. For example, in some parts of Kalmunai, Peraliya and Telwatta (in Hikkaduwa) the zone of destruction has extended about half a kilometre inland. At the same time there were structures relatively undamaged within 100 meters distance from the shoreline. This could be the result of both the relative strength of the tsunami and in the quality of construction.

Tsunami devastation was severe in areas where the natural coastal vegetation, such as mangroves, or natural sand dunes have been removed from the coast. A recent paper by Dr Ranjith Premal De Silva (The Island, 26.01.2005, p.6) has highlighted this fact with examples. According to his article mangrove vegetation along the coast have the ability of resisting the enormous force of the tsunami waves. It is a natural buffer against tsunami waves. For example USGS team has pointed out that the removal of sand dunes (to get a better view of the sea) close to the Yala Safari-Hotel has been a major cause for the total destruction of the safari hotel. Similarly it has been reported that Pichavaram and Muthupet areas in Tamil Nadu suffered few human casualties, and less physical damages, due the presence of a thick mangrove vegetation cover along the coast. (The Island, 26.01.2005, p.14)

Tsunami Sand Deposits

Tsunami waves often leave a deposit of sand calling cars to mark that a tsunami has been there. These deposits give an indication that such locations are at risk from future tsunami attacks. Such deposits were found in almost all the tsunami affected areas of Sri Lanka. The accumulation of sand deposits has started about 50 meters inland. The thicknesses of the sand deposits show variations from a maximum of 37 centimeters to a minimum of 2 centimeters about 150 meters inland. Tsunami sand deposits at Nilaveli Head, Kalukumbura and Telwatta are good examples. At Nilaveli, the sand deposited by the tsunami is light colored and overlies a pre-tsunami darker sandy soil to a thickness of approximately 15 cm thick. The USGS

¹ Geological Survey (G.S.G)

Tsunami Impact Statistics

Sri Lanka is one of the countries badly affected by the Tsunami – 2004 disaster. Out of the 13 districts along the coastal belt, 12 districts were affected by this disaster. According to the estimates of the Ministry of Women Empowerment and Social Welfare, about 31,000 people were killed while another 4,100 reported to be still missing. A large number of buildings were completely wiped away. Some damaged buildings are not useable. Extensive damage to the Infrastructure of these districts was badly affected disturbing the livelihood of the people. Tourism and fishing are among the mostly hit industries. Thousands of families: men, women, children got displaced. Many displaced families have been relocated in temporary camps set up in temples, schools and other religious places etc. while others have moved to the houses of their friends or relatives.

The biggest challenge that the government facing is bringing the lifestyle of the affected people to normalcy. This requires reconstruction of their damaged houses and providing them livelihood assets such as boats for affected fishing communities. Reconstruction of the damaged infrastructure facilities is another high priority need. For planning and decision making on the rebuilding the nation devastated by this disaster, it is essential to have reliable and accurate information on the impact on the lives and properties caused by the disaster.

The Department of Census and Statistics conducted a census covering all affected districts to evaluate the damages to the lives and the buildings in the affected areas. The census was conducted in two stages. All the buildings including those wiped out were listed during the stage 1 by updating the list of buildings prepared for conducting the Census of Population and Housing – 2001. In addition to the listing of buildings, some information required to compile a set of key indicators on the damages to the buildings was also collected in the stage. Detail data collection was carried out during the stage 2. Preliminary reports presenting the information collected during the stage 1 of the census have been released for all the affected districts including those in the Northern and Eastern Provinces.

Methodology

This census was conducted in all affected districts namely, Puttalam, Gampaha, Colombo, Kalutara, Galle, Matara, Hambantota, Anpara, Batticaloa, Trincomalee, Mullativu and Jaffna districts. Enumeration was done only in the affected census blocks of these districts,

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and it was conducted in two stages. Sri Lanka is consisting of 9 provinces, 25 districts, 325 Divisional Secretary Divisions and about 14,000 Grama Niladhari Divisions. For the purpose of Census of Population and Housing – 2001 conducted by the Department, each GN Division was further subdivided into a few smaller areas called Census Blocks. The objective of this sub division was to ensure that the enumerator assigned for the Census Block completes his fieldwork on the final count within a given short period of time (about 6-12 hours). For urban areas, a census block included about 80 housing units while in rural and estate areas a census block included about 60 housing units.

Generally, the first step in any census taking operation is to update the list of all buildings to be enumerated and this list is used as the sampling frame for subsequent surveys. A frame consisting of all buildings for Sri Lanka was compiled for the Census of Population and Housing – 2001. This frame pertaining to the affected census blocks were updated by the field staff. This frame was revised giving due consideration to the new buildings that have been constructed and demolished after the year 2001. To provide information immediately needed for planning purposes, some key information pertaining to the buildings and the occupants was collected during the listing stage. The information collected during the listing stage is given below:

- a) Postal address before the disaster
- b) Name of the head of the household before the disaster
- c) Type of building before the disaster: Housing Unit; Living Quarter, Institute; Non Housing Unit
- d) Whether the building is still existing
- e) Present condition of the building (Completely damaged)
- f) Number of persons lived in the building before the disaster
- g) No. of persons currently living
- h) Where do the usual residents of the unit now living (Same unit, With friends/relatives; Camps etc.)
- i) Address of the occupants if living outside the unit after the disaster
- j) Economic activity of the unit before the disaster
- k) Whether the economic activities are still carried out

Detail information on the damages to the lives and buildings caused by the disaster was collected at the second stage of the census. Field staff of the department enumerated the occupants of the damaged buildings. In the case of the completely

damaged buildings attempts were made as far as possible to track where the occupants of such buildings currently living and to collect the information by visiting them.

Data collection instruments (questionnaires) were so designed that some key indicators could be compiled before the commencement of computerisation of completed questionnaires with the objective of releasing required key information soon after the data collection is over. Preliminary reports presenting the findings based on the quick manual processing of data collected at the first stage of the census have already been released. These reports have been published in the Department's website: www.statistics.gov.lk

Preliminary findings

Several key indicators have been compiled at District, DS division and GN division levels, based on the data collected during the first stage of the census. These indicators include number of affected GN divisions, number of affected Census Blocks, number of buildings (housing and other) in the affected census blocks before the disaster, condition of building after the disaster (completely damaged, partially damaged and cannot be used, partially damaged and can be used). Indicators were compiled for housing units as well as for other types of buildings.

GN Divisions affected by the disaster

In the affected Divisional Secretary (DS) Divisions, there are 1971 GN Divisions. Out of these GN Divisions, 32 percent has been reported to be affected. Total number of census blocks in the affected GN Divisions is 4,880. Of these census block, 2,611 i.e. 54 percent has been affected by the disaster.

Damages to the housing units

There had been 158,011 buildings used as housing units in the affected census blocks of Sri Lanka before the disaster. Of these buildings 25 percent have been completely damaged. Another 6 percent have been partially damaged and not usable. That is, little over 30 percent of the housing units have been either completely wiped out or damaged to the extent that those cannot be used any longer. Percentage of buildings damaged but usable is 24 percent. The balance 44 percent of the buildings have not been affected.

The highest share of 49 percent, of the completely or partially damaged housing units is reported from the Eastern Province. The next highest share of 23 percent was reported from the Southern Province. Western Province and

Northern Province accounted for 15 percent and 13 percent of the completely or partially damaged housing units, respectively. In the North Western province, only Wemmassuwa DS Division of Puttalam district was affected and number of housing units affected was only 64.

When compared across the district, highest number of housing units, damaged either completely or partially and unusable, was reported from the Ampara district. Total number of such buildings reported for Ampara district was 10,538. This is followed by the Batticaloa and Galle districts and the corresponding numbers were 3,905 and 5,169 units respectively.

The highest number (8,139) of completely damaged houses was reported from the Ampara district and it accounts for 21% of the housing units existed before the disaster in the affected census blocks of the district. This is followed by 7,455 housing units (19%) completely damaged in the Batticaloa district. Number of housing units completely damaged in the Galle (4,482), Mulatiyu (4,428) and Trincomalee (3,093) are also considerably large. The reported number of houses damaged completely in Kalutara, Matara and Hambantota districts are 2,066, 1,667 and 1,088 respectively. The lowest number (1) of completely damaged houses was reported from the Puttalam district. This is followed by Gampaha district (227 Units).

One of the requirements for settling displaced families back in their own homes is to reconstruct/repair their damaged houses. Altogether, 89,767 houses have been completely or partially (usable and not usable) damaged by the disaster. Over 12,000 housing units have been damaged in each of the Galle, Batticaloa and Ampara districts. Between 6,000-8,000 housing units are reported to be damaged by the disaster in the Trincomalee, Colombo, Matara, Kalutara and Mulatiyu Districts.

Damages to buildings other than housing units

There had been 26,179 buildings other than housing units in the affected census blocks of the Tsunami affected 12 districts. Total number of buildings either damaged completely or partially is 11,775 and it account for 45 percent of the buildings existed before the disaster. Out of these 25,385 buildings, 18 percent has been damaged completely. Another 5 percent has been partially damaged and unusable. The percentage usable partially damaged building is 21 percent.

Eastern province is the most affected district with respect to the share of completely and partially damaged buildings other than the housing units, is concerned. The share of this

indicator for the Eastern province is 40 percent. The next highest share of 36 percent is reported for Southern Province. The Western Province accounted 16 percent of the total number of completely and partially damaged buildings other than the housing units and its share for the Northern Province is only 8 percent.

When compared across districts, the highest number (1,688) of partially or completely damaged buildings other than housing units is reported from the Ampara district. This accounts for nearly 22 percent of the completely or partially damaged buildings other than housing units of the affected census blocks of the Tsunami affected district. This was followed by the Galle district. Reported number of damaged buildings was 1634 and as a percentage it was 22 percent. Between 400 to 600 such buildings have been damaged in the Batticaloa (859), Matara (670), Kalutara (585), Trincomalee (444), Gampaha (421) and Mulatiyu (408) districts. The damage for Hambantota (358) and Colombo (187) is reported to be less than 400 units.

Total number of buildings other than housing units completely damaged is 4,853. Over 500 completely damaged buildings are reported from the Ampara (1173), Galle (692) and Batticaloa (525) districts. For all other districts, number of buildings completely damaged has been 400 or less.

Damages to all types of buildings (Housing units and other)

The total number of all types of damaged buildings (completely or partially) is 100,543. Out of this, 83,252 (83%) had been used as housing units before the Tsunami. The balance 17% had been used as other types of buildings.

There had been 184,190 buildings (all types) in the affected census blocks of the Tsunami affected districts. Out of the 184,190 buildings, 100,543 buildings, that is 55 percent has been either partially or completely damaged. Number of completely damaged buildings is 44,418 and this corresponds 24 percent of the total number of buildings in the affected census blocks. Percentage of building damaged but usable is 24 percent.

When compared across the provinces, the highest share of 47 percent of completely or partially damaged buildings is reported from the Eastern Province. The southern province reported the next highest share of 26 percent. The percentage of completely or partially damaged all types of buildings in the Western and Northern provinces are 15 percent and 12 percent respectively.

When compared across the district, the highest number (20,506) of all types of damaged buildings irrespective of whether usable or not, is reported from the Ampara district and this account for 21 percent of the all damaged buildings. This is followed

by the Batticaloa and Galle districts and corresponding percentages are 18 percent and 15 percent respectively. Percentage corresponding to the buildings damaged in all other districts together accounts for 42 percent of the all damaged buildings.

Summary

In terms of the number of damaged housing units, the most affected three districts are Ampara, Batticaloa and Galle Districts. Number of housing units damaged in these districts is 18,810, 17,405 and 12,209 respectively. Least affected districts are Puttalam (64), Gampaha (854) and Hambantota (2374). When (in total number of buildings other than housing units are considered the worst affected three districts are Ampara, Galle and Batticaloa Districts. Number of such buildings damaged in these districts were 1,688, 1,634 and 859 respectively. Puttalam, Colombo and Gampaha Districts are the least affected districts with respect to this indicator. Numbers of buildings other than housing units affected in Colombo and Gampaha Districts are 187 and 421 respectively.

The buildings in the affected areas were largely housing units. It was found that there had been 151,386 housing units in the affected census blocks of Tsunami affected districts while the number of buildings other than housing units had been as low as 25,385. Possibly due to this even when the all types of affected buildings are considered the worst affected three districts are still the same as those identified with respect to the indicator, number of damaged housing units. Number of damaged all types of buildings corresponding to the worst affected districts are 20,939, 18,603 and 15,379 respectively. The least affected districts with respect to the same indicator are Puttalam, Gampaha and Hambantota and the corresponding numbers are 681,708 and 2,968 respectively.

The Census of Buildings and Persons Affected by the Tsunami - 2004 was conducted to provide much needed information on the damage of the lives and buildings caused by the Tsunami disaster. This Census was conducted only in the affected census blocks of the Tsunami affected districts. This analysis is largely limited to the affected buildings. Detail data on the other characteristics about the all types of buildings, occupants and their economic activities and dead and missing persons have been collected and are being computerized. Findings of the analysis of these data will be released once the processing of computerized data is complete. By analyzing these information together, it could be possible to assess the impact of Tsunami on the lives and buildings more accurately and reliably for the different geographical areas.

For further information, www.statistics.gov.lk

Child Protection in the Aftermath of Tsunami

There is a traditional responsibility for elders to protect children in our society. The traditional responsibility for child protection in our society primarily lied within the nuclear family unit. The children are brought up in the nuclear family units and cared by the nuclear family. If the nuclear family is strong socio-economically, with a good value system relevant to Sri Lankan culture, a good upbringing is generally ensured for children. This upbringing includes provision of basic needs like food, shelter, clothing, health care love and protection. In this setting children are expected to go through education and a culturally acceptable disciplinary process to become a responsible adult. There is a tendency for strong family units to even over-protect children with no allowance for independence which may be harmful for child's development. State in general does not interfere with this traditional child protection responsibility. State sponsored free education, free health care, immunization and welfare schemes for poverty alleviation also contribute for child protection directly and indirectly.

Throughout the history this traditional child protection system faced challenges. Challenges came from dysfunctional families like broken families, socio-economically unstable families with domestic violence, families who face natural or accidental disasters. Our society was not expressively concerned about this phenomenon before. For an example a nuclear family may break up, outside the legal system. Then relatives and parents make internal arrangements for care of the children. Child rights and state responsibilities never came into the picture in these initial arrangements. If the parents die in an accident relatives take care of children with internal arrangements. This was the traditional responsibility of caring for "vulnerable" or "at risk" children. State does not get involved in that decision making process. State would get involved once child abuse and neglect is reported after the initial care arrangement. Sometimes this care arrangement worked very satisfactorily but sometimes it did not. Like any system it is not perfect. State would be concerned about those children who are neglected and not protected in this scenario.

This traditional child protection system within the family units was also challenged by more recent trends over the last two to three decades. Care of children when both parents are

at work is a challenge in the Sri Lankan society. Doing this without compromising work ethics is a difficult task. Care of children of migrant mothers is a challenge. In one of our studies 20% of children admitted to the hospital due to abuse or neglect were from families with migrant parents—mostly mothers working in Middle-East. These families in practical sense are broken families with separated parents and informal care arrangements with no legal binding. Although initial expectations of financial benefits to related care givers attract a carer, entrusted work and responsibility is too heavier than financial benefits that stresses on coping skills of those related care givers. None of us were trained in parenting skills and we find it hard to discipline children without any form of abuse in the family unit anyway (i.e. without use of corporal punishment and emotional abuse). The skills required to look after children without parents are never imparted to their related care givers and is not seen as an issue in this paradigm.

The role of the National Child Protection Authority

The need for a formal child protection system in Sri Lanka was realized after 1994 with the appointment of a presidential task force on child protection by Her Excellency the President Chandrika Bandaranaike Kumaratunga.

This resulted in the creation of National Child Protection Authority (NCPA) under the act No.50 of 1998. The NCPA became the coordinating agency for all the other state and non state agencies working on child protection. These state agencies included departments such as Police, Labour, Education, Attorney Generals, Health, Probation and Child Care and non state agencies like UNICEF and other NGOs.

The system mainly focused on children affected by all forms of child abuse and neglect (CAN) to protect and nurture them i.e. rescue activities. It also dealt to a limited extent on "vulnerable children" to prevent or minimize abuse, neglect, trafficking and child labour. Influence on the society and the country was variable from minimal or no impact in certain areas e.g.: North-East under LTTE control to more effective networks in other areas.

The NCPA also has District Child Protection Committees (DCPC) established under the act No. 50 of 1998. DCPCs also have a multidisciplinary team like the NCPA. Regional or local represen-

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tatives of those departments represented in the NCPA are in the DCPC. In addition there are religious leaders, NGOs, lawyers and child rights promotion officers. The district secretary, paediatrician or the specialist judicial medical officer co-chair the DCPC by statute.

NCPA plays a big role in making policies, initiating legal reforms, creating awareness on child abuse and neglect. It has investigation powers under the police unit. It also monitors affected children especially in the legal system.

DCPCs work at grass roots levels. It handles individual cases of abuse, provide interventions in situations of need, handle problems of children's homes and implement support programmes for vulnerable children and monitors progress of children after placements at grass root levels. It also conducts educational programmes to create awareness. Over the last few years Galle DCPC has conducted more than 20 educational programmes every year. It also identifies loopholes in the procedure of handling individual cases of abuse and proposes suggestions to legal and administrative reforms required for protection.

The NCPA has a Chairman, a Deputy Chairman, a Board and an Advisory Committee, police unit and other support staff in the Head Office. It is funded by the annual government budget. However lot of its activities are funded by the NGOs, cooperate sector and other donors. eg. Its head office was built on an outright grant of the British government.

Unlike NCPA most DCPCs do not have a temporary or a permanent office space. Galle DCPC meets in the district secretary's office. Every DCPC gets an annual grant of 120 US\$ from the NCPA for expenditure on meetings. Jaffna DCPC is fully supported by UNICEF to run an office, a computer database and all members are paid a monthly allowance. There are some districts without DCPCs as yet.

Most of the programmes conducted by the DCPC are supported by NGOs, other state departments and - well wishers. Work and stability of the DCPC and hence the child protection programmes depend largely on commitment and dedication of inspirational team members for success. Therefore, DCPC functions are variable in the country. To face the out-

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comes of Tsunami this system should be strengthened.

Dept. of Probation and Child Care

State arm to provide care and protection for children and monitoring care is the Dept. of Probation and Child Care Services. This was established as the Department of Certified Schools in 1942 and probation work started in 1966. This is a devolved subject under the provincial councils according to the 13th amendment of the constitution. This was suffering with administrative problems like any other part of the government's administrative machinery. It is understaffed, it is inefficient, it is poorly supported in needs. In service training for existing staff is limited and has a minimal impact towards changing needs of child protection. It is also liable for corruption. It may take weeks to months to get a report on a single child if needed. Communication and transport were the two areas the department was suffering mostly in carrying out duties related to Tsunami, affected children. There had been problems even before Tsunami.

Effects of Tsunami on children

Large number of children died in Tsunami. It was estimated that nearly 40% of deaths were among children. There were concerns regarding lost children. Did they die or were they trafficked (abducted)? In Galle several cases were investigated but no evidence for trafficking emerged. Some were positively confirmed as dead. The belief that these children were alive and were abducted after the Tsunami is unrealistic.

Then it also created a large group of "vulnerable children" who lost either one or both parents. In southern province there are 1251 children who lost one or both parents. In Galle there are 154 children who lost both parents and 509 children who lost one parent. In Matara there are 15 children who lost both parents and 82 children who lost one parent. In Hambantota there are 115 children who lost both parents and 376 who lost one parent. It also created another massive group of children with intact nuclear families but displaced internally. Both groups have lost their houses and properties, books, schools, health care institutions and livelihood of their parents. There is a group of children who lost parents in Tsunami during traveling or while at work, but did not lose properties and other protective factors. Their needs are different to others, as they are living in islands of the country. Presence of the nuclear family unit, facilities for education, availability of health care and livelihood of parents protect children against abuse and neglect. These chil-

dren have lost one or more of their protective factors that existed before and made them vulnerable today. State was not dealing with the category of "vulnerable children" well even before Tsunami.

Suddenly both traditional and formal child protection systems had to face a role change from rescue activities to preventive activities that were addressed poorly even before Tsunami. That role change had to take place with a weak administrative machinery destroyed by Tsunami, limited resources and a weak and inefficient legal system.

Performance so far

Initial surveys were carried out by the NCPA along with UNICEF and Dept. of Probation and Child Care in Galle. On 01.01.2005 and 02.01.2006 all camps in Galle were visited and data were collected regarding children who have lost one or both parents. It identified 41 children who lost both parents and another 128 who lost one parent. This is in quite contrast to the subsequent figures on data collected by CRPOs in Galle as mentioned previously. Even the current figures may not be 100% accurate, because there are some who have moved into other parts of the country after Tsunami and not accounted as yet.

Policies regarding unaccompanied children: (children who lost both parents)

There was confusion regarding what should be done regarding these children. At least 3 ideas were proposed. One was to institutionalize all of them, second was to keep them with extended families and third was for adoption. In fact more than 400 people registered to adopt children following Tsunami in Galle district probation office alone. 16 children were institutionalized in Galle district. All the others were kept with the extended families, as it would happen in any other situation of accidental parental deaths before Tsunami.

Support systems

There were support programmes for vulnerable children before Tsunami. Some were state sponsored and others were by the NGOs.

State support schemes

(1) Fit persons assistance scheme

This scheme was in operation before the Tsunami. The Department of Probation and Child Care could identify at risk children, who have lost one or both parents and cared by a related care giver (aunt, grandmother). Then through the court of law such a person is appointed as the legal guardian and department pays them Rs.200.00 (2US\$) per month as an allowance to look after the child. This is an alternative to institutionalization. The payment is done

by writing vouchers monthly and the guardians would visit the probation office monthly to collect the Rs.200.00. This is obviously a tedious process but fulfils the financial regulations of the government.

(2) Institutionalization

When such a carer is not available or cannot be found immediately, the child is institutionalized in a state or voluntary children's home. Government grant for each child is Rs.10.00 per day to support these institutions.

Both these schemes are unable to support a child effectively in any setting to address the issues of protection.

(3) State sponsored poverty alleviation programmes to support families with no discrimination based on the presence or absence of parents, e.g. Samurdhi. This is a general scheme not specifically addressing the needs of children but may provide some benefit indirectly to protect children.

Other schemes

There were many other NGOs supporting the community people at grass root levels outside the government structures.

e.g. Sylvia Foundation (NGO) in Galle was supporting vulnerable children by giving scholarships to fund educational needs. No legal guardian is appointed through the court of law. Scholarship was worth Rs. 500.00 per month with another Rs.200.00 been deposited in a bank account for the future.

New initiatives after Tsunami

(1) Improving the fit persons assistance scheme

UNICEF initially pledged to support all children who lost one or both parents by funding the government to increase the grant to Rs.600.00.

This has materialized after some delay. There was a delay in policy making whether to include all children who lost one or both parents and on the amount of the grant. Now children who lost both parents are getting it. By May 2005, 90 children in Southern province were getting it. As in the current system the local guardian has to obtain money from the Department of probation and child care through the tedious process described above. This can be easily converted to an electronic money transfer system.

Due to poor communication facilities and transport difficulties appointing legal guardians in fit

scheme for all children who lost both parents may take several months.

(2) Sylvia Foundation

Sylvia Foundation is an NGO working in Galle for 15 years. It has maintained a good Children's home since 1993. It has initiated a scheme to grant Rs. 500.00 to Rs. 3500.00 for children who lost one or both parents in Galle district. If the mother is dead a child gets Rs. 500.00 per month upto a maximum of Rs. 2500.00 for a family. If the father is dead a child gets Rs. 1000.00 per month per child upto a maximum of Rs. 3500.00. If both are dead a child gets Rs. 1500.00 per month upto a maximum of Rs. 3500.00 per family. Every child gets a monthly deposit of Rs. 200.00 in a savings account. The scheme will continue upto 18 years. They have informed the DCPC and the Department of probation and child care the names of the recipients. So far 328 children have been included in the project. This is a wonderful performance for a small organization with little overhead costs and limited staff. What is more important is that it coordinates work with the government machinery with a good understanding of its role. It will certainly help to prevent duplication and wastage of resources.

(3) SLCP (Sri Lanka College of Paediatricians)

Rainbow Trust has initiated a Sponsorship Scheme for children who lost one or both parents. A monthly grant of Rs. 3000.00 would be made until the child reaches 18 years. Rs. 500.00 of this will go into a savings account. They have initiated it for 39 children so far, and most of them are from south.

(4) Southern Tsunami Trust (STT)

Initiated a scholarship scheme for 200 children on 31.05.05 Selection criteria are income of parents and parental education status and not parental loss. Scholarship is for 3 years and amount is variable from Rs. 1000.00 to Rs. 2000.00 per month. A part of it goes into a fixed deposit. This scheme has recognized the requirement to support the vulnerable children who are in need and not only who lost parents in Tsunami.

In fact emotional outbursts have concentrated work only on those children who lost parents. This has failed to recognize that parental presence is only one factor contributing to child protection and not necessarily the only factor. It is my opinion that the STT scheme will have the biggest impact for child protection more than others if implemented successfully.

(5) It appeared in newspapers that Her Excellency the President has initiated the sponsor-

ships scheme to children who lost both parents along with Dr. Hiranthi Wijemanne the current chairperson of the NCPA. A monthly grant of Rs. 5000.00 is given per child. Rs. 2500.00 of this will go into a fixed deposit.

Children's villages were also proposed by two organizations and are likely to come up in the future. It may take the SOS children's village model with some differences.

Many other organizations have initiated sponsorship schemes and support programmes e.g. Sri Lanka Cricket. Details are not available and sustainability of these projects are doubtful. There is a very high risk of duplication of support schemes due to absence of coordination between government and the NGOs and in between NGOs themselves. If sponsorship is duplicated by all these organizations for one child who lost both parents it is possible for a child to get up to Rs. 15000.00 per month. There is also unnecessary competition between NGOs when there is enough work to be done.

Needs assessment

Many data collection forms were filled by Tsunami affected people. These should have been enough to assess needs. Needs assessment should be on individual case by case basis. Eg. Government decided to pay salaries of public servants who died in Tsunami to their dependents. If so these dependents may not need any other form of financial assistance but may need psychosocial support and monitoring of children. Unless we base provision of support on individual needs risk of wastages of resources is very high. For this there should be more decentralization of the decision making powers to grass root level structures of the government. Then these structures could coordinate with locally active NGOs easily.

Monitoring

In our country various programmes were initiated to alleviate poverty, strengthen family units and to protect children indirectly in the past. Impact is variable. There are many reasons for failures. One is not spending the money for its intended use. This is due to inadequate monitoring and evaluation of the programme, coupled with lack of compliance regulations for recipients. There should be preconditions for any sponsorship scheme and discontinuation of the scheme if compliance regulations are not met with. If this places children at risk it should be the duty of the supporting organization to inform relevant authorities to intervene. No agency other than the NCPA, Probation and Child Care Department, DCPC and CRPO/Probation officers is capable of doing this. Therefore it is vital that NGO/government partnership is built on any programme to protect children by supporting families. In this regard the STT has designed a

monthly report system, a home visit for inspection to monitor the family using a data base. STT request the carers to sign an agreement once sponsorship is initiated. The agreement lays down the conditions.

Report by classteachers, gramasevakas, CRPO would become essential to monitoring especially because other factors such as alcoholism in the father may determine the outcome of the support programme. State agencies have the power to take action on defaulters which no other NGO is capable of performing.

Will the sponsorship schemes be effective?

Institutionalization as it is today is certainly not effective to protect and nurture children to produce useful citizens. Alternatives are limited. Adoption is not widely accepted in the country for older children and the organization and monitoring is difficult. Viable alternative would be foster care with sponsorships.

Education helps to protect children and it alleviates poverty in the long run. If we could ensure continuation of education, provision of basic needs and care in a family setting it should protect and nurture these children to become productive citizens one day. Over the last 50 years free education has had a big impact to alleviate poverty and social upliftment for low social classes. It should be applicable to Tsunami affected people today.

Threats

Several factors would threaten the success of these programmes.

Lack of resources to implement and monitor the sponsorship schemes will remain the most important challenge. Weaknesses of the legal systems will continue to harass Tsunami affected children unless remedial measures are taken in the near future.

eg. One extended family came up on 11th April 2005 declaring themselves unable to look after the children due to lack of support.

Lack of professionals & professionalism to handle changing situations and needs of children will be felt unless the existing staff is trained to deal with complex problems.

Failure to provide other needs, eg. Education, vocational training, life skills will affect the ultimate outcome of these children and the success of sponsorship programmes. Lack of coordination between the government and non governmental agencies will result in duplication and wastages of resources. Lack of individual case by case needs assessment will also result in wastage of resources.

Future

In the immediate aftermath of Tsunami there was a massive national and international response towards affected children which was largely emotional. Focus was mainly on initial psychological support and provision of relief.

Long term programmes for protection and nurturing children were pledged but has not materialized at the required scale. Even when some projects materialize, provisions may fall well short of demands and targets. Further the variability in the support programmes may result in a variable impact due to differences in selection criteria, quality of support, sustainability and weaknesses in monitoring. Therefore it is absolutely essential to coordinate activities between state agencies and national, international non state agencies to avoid duplication and wastage to improve utilization. Further it may also reduce the management costs of these programmes leading to optimum utilization of available resources.

Conclusion

The child protection agenda has shifted our focus from 'rescue' of victims of CAN to prevention of CAN 'vulnerable children' after Tsunami. Magnitude of the problem demands an administrative system that is efficient and effective.

Ability of the existing systems with limited resources to cope with the needs remain doubtful six months after Tsunami without strengthening and greatly enhancing its capabilities. Coordination not only at the central level but also at the grass root level is mandatory for optimum utilization of resources.

Contd. from Page 06

by local ownership and a long term commitment was highlighted in the speech delivered by Hilde Johnson, Minister of International Development of Norway at the ministerial level conference that was recently held in Geneva. She stated, "We have also learnt that the rapid influx of organizations and aid following large scale human crises can have disruptive economic and social effects on the countries concerned. Government structures are overburdened with large numbers of un-coordinated demand from a multiplicity of donors and aid organizations. There is a higher risk of corruption. The focus on the current disaster and the large amount of funds pledged to deal with it could well increase the problem.....". Donor circus seems already to be in full swing. Coordination and a clear division of labour must be established and this is also urgently needed for the reconstruction phase. The lack of country ownership has always been the weak point in implementing successful development programs. The government and its population should not be relegated to being spectators. The challenge for Sri Lanka therefore is to take the lead in driving the reconstruction phase and the donors must make a genuine long-term commitment to improve the well being of the affected people.

Conclusion

The post-tsunami reconstruction poses new challenges as well as opportunities. From the macro economic perspective, it is important that the rehabilitation and reconstruction will not become a fiscal burden and not undermine the ongoing fiscal reform towards reducing debt financing in the National Budget. In terms of overall economic development, the additional claims on reconstruction should not be at the cost of the development ex-

penditure elsewhere. Multilateral and bilateral donor funding need to be channelled towards building infrastructure that will attract investments which revives these local economies in order to create income and employment. Owner driven housing schemes and micro enterprises and SME led livelihood support programmes will encourage individual initiatives that will fast track rehabilitation work. Non-government Sector can become a powerful provider of resource to co-finance such initiatives that the Government has already launched.

The recovery from Tsunami cannot be expected only by concentrating Tsunami reconstruction activities. The overall success will depend largely on how the rest of the economy is managed. The need to create a higher revenue generating capacity through both taxation and re-strengthening of strategic enterprises should not be forgotten. Productive use of government expenditure and repositioning of the government sector delivery mechanism, particularly at decentralized level is equally crucial. The SME focus, private sector development initiatives as articulated in the government policy statement and in the recent budget must be accelerated. Wasteful subsidies which have hindered productive investments and local production, should be phased out with a view to creating incentive structure favourable for economic development. The national budget should be transformed into a revenue surplus over the medium term to bring down inflationary pressures to maintain Sri Lanka's competitive edge in the global economy. Failure to implement these initiatives in a coherent and consistent manner together with well conceived reconstruction strategy in the affected area will undermine the prospects for reducing poverty and rapid recovery in the Tsunami affected areas.

Contd. from Page 11

team has identified another sand deposit measuring to a thickness of 37 centimeters at Kalukurunda (Near Kalutara) within 80 meters distance from the shore.⁷ In Telwala area, (close to Hikkaduwa) the thicknesses of the sand deposit vary between 10- 20 centimeters. In Yala, the sand deposit measures up to 22 centimeters. In most parts of the coastal area submerged by the tsunami waves, occurrence of a thick sand deposit is a common feature, and it has adverse effects on the natural vegetation. It is apparent that in most places, vegetation cover existed before the tsunami (specially small plants and shrubs) has dried up (or dead) due to the sand deposits and also due to the intrusion of sea water. Although tsunamis are capable of eroding the land, erosion in Sri Lanka was often concentrated in a relatively narrow zone near the coast. For example, at

Monkomi, there was evidence that a grassy area eroded about 1 meter in the vertical in a zone about 20 to 30 meters wide near the coast.

The tragic experience of Tsunami is undoubtedly the most catastrophic disaster throughout the history of Sri Lanka. To day the greatest challenge is rebuilding the devastated areas in a systematic way. This is a very important issue that should be dealt with extreme care. Especially the proposed 100 meter construction free zone along the coast must be strictly considered in order to secure the lives of coastal population. On the other hand maintaining a natural coastal vegetation zone will be helpful to minimize the coastal erosion.

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Rehabilitation & Reconstruction of Tsunami Victims' Livelihood

The Tsunami of 26th December 2004, has devastated the family system prevailing in the coastal belt of Sri Lanka for a long time. The damage caused by the Tsunami to the family system in the affected areas is higher than the corresponding physical damages. The primary social unit of a society is the family. The smooth functioning of the family is essential to maintain good social order of any society. When the structure of the human family is disturbed due to some reason, it will create many social problems which may lead to more complicated social problems.

The family system in the coastal belt of Sri Lanka has distinct characteristics different from that of rest of the country. Its caste system and other social hierarchical systems are different from the social structure that prevails among people of the other areas of the island. Most of the coastal dwellers belong to the fishing community and their livelihood depends on the fishing industry. Others are engaged in various other secondary vocations. Economically, the majority lives below the poverty line and, when compared with those who live in the interior regions of the country.

However, there are many accesses to overcome the above mentioned dilemma by providing means of living for the affected families again. For that it is compulsory to identify the nature of former sources of family income, social network and the related infrastructure facilities. And also it should be traced the current potentials of the family that help to continue the gainful earning. Thus, it is compulsory a very reliable and comprehensive data base for whoever engage in this field to plan and implement any reconstructive and rehabilitative activities.

Magnitude of Task

This is the worst ever natural disaster in Sri Lankan history. The table 01 shows the magnitude of damages that took place in many districts which were affected severely. Along with the disaster, there were unforeseen challenges and tasks lineup, mainly for the government officers and then for others. The challenges and tasks identified are:

1. Deaths
2. Missing
3. Injuries
4. Relief work

5. Psychologically affected individuals
6. Destruction of private and common properties
7. Destruction of livelihood
8. Displacements
9. Social welfare camps
10. Uprooted and weaken social bonds in different levels
11. Reconstruction, relocation and rehabilitation
12. Buffer zone
13. Land fragmentation and scarcity
14. Funds allocation, formation of government and NGOs organizational structures and activities
15. Disparity between affected and non affected communities
16. Research

There are many manifest functions which are based on issues mentioned above. Sociologically, there are many latent functions which generated as a result of manifest functions, but not concerned in this article. Deaths, missing, and destruction of property (private and common) are the main issues that are related with other all issues of Tsunami disaster. The responsible authorities face these unforeseen challenges and tasks successfully. On the other hand, the emotional as well as rational activities initiated by various local organizations and other bodies, it is not an easy challenge and tasks for government officers, especially Divisional Secretaries to face this tragedy. Though, they mediate successfully still there are several other problems.

Role of the Government and NGOs

As usual, the first government body which directly involve for the relief measures was district and divisional administrative services. The District Secretary at district level and Divisional Secretary at divisional level had been empowered to take emergency and relief measures. Simultaneously, armed forces and police too had entered to the scenario. Meanwhile, the political leadership made several emergency meetings and decided to set up a central coordinating mechanism of the entire function. It was Centre for National Operation (CNO) headed by Dr. Tara de Mel under the President, Chandrika Kumaratunga. However, there was another body which is Human Disaster Management Council (HDMC) headed by Mr. Sarath Chandrasiri Vithana and it also comes under President's Management. As a result of the flood disaster in Ratnapura and Galle

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Districts in 2003 this council was established. The HDMC too operated simultaneously but it was under the CNO control. CNO was able to, utilize each and every government ministries and departments in fruitful ways and also able to get all other assistances from various local and international organizations. This mechanism functioned until the end of January 2005 and though there were some criticisms of lack of proper coordination it was a natural situation when we meet these type of calamities. Just after the unforeseen challenges and tasks, all ministries took over the burden of dealing with Tsunami Victims.

Task Force for Rebuilding the Nation (TAFREN) replaced the CNO and it has been coordinating the reconstruction and rehabilitation programs in many districts. But, the crucial problem which has no end so far is to establish a central body with the LTTE and the government to launch long term plan for Tsunami affected families in Eastern and Northern parts of the country.

NGOs of local and international level including international agencies such as UN establishments have been working in many fields of Tsunami affected areas of the country. More or less they have linked with TAFREN and government administrative structure of each district to implement their post-Tsunami activities. It is clear that the government alone cannot overcome all consequences erupted by Tsunami. Government needs their support due to vulnerable financial situation unless it can clearly avoid their mediation to mitigate negative impacts like India. Consequently, today, these organizations are heavily involved in post-Tsunami activities in Sri Lanka. There are positive and negative impacts. As we are all aware, some organizations are working for the victims and simultaneously having hidden agendas as well. Especially, the allegation that some NGOs have close links with LTTE and supporting them has caused many prejudices among the majority of the people in the country. The negative image developed as a result of these contro-

Table 01 - List of Activities

Short-term	Long-term
1. Relief work	1. Develop infrastructural facilities for permanent resettlement locations.
2. Special health and sanitary programs for special categories in particular and for victims in general	2. Identify the victims or affected parties including in the buffer zones who wish to reside in different locations.
3. Identify the actual damages to the properties and the people	3. Declare the buffer zone and start develop vegetation which helps to protect the buffer zone.
4. Compensation for direct victims	4. Declare the activities that can be continued within the buffer zone.
5. Identify the buffer zones and other remedies.	5. Build permanent houses for the victims.
6. Identify the lands for transits and permanent houses	6. Identify the social hierarchical order of victims before resettling them.
7. Make MOU with donor agencies on post-Tsunami activities	7. Select victims according to their social status for resettlement.
8. Build transit houses for direct victims	8. Introduce livelihood improvement approaches for victims.
9. Awareness and counselling programs for victims on natural disaster	9. Introduce community mobilization programs to enhance their social integrity.
10. Plan long-term reconstruction and rehabilitation programs for the affected families	10. Evaluate the development of victims livelihoods.
11. Establish Central and regional coordinating centers	11. Introduce remedial approaches to overcome shortcomings.
	12. Ensure the sustainability of their livelihood.
	13. Introduce monitoring and evaluation systems on buffer zone and its activities.

versal issues is resulted negative impact for other NGOs when they made face-to-face interaction with the people. Another prejudice against the NGOs is conversion to their sect or religion. Therefore, we need Public Sphere to discuss these controversial issues related to the post-Tsunami activities in Sri Lanka. Otherwise we are underestimating the service done by some other NGOs.

Role of International Agencies

International agencies such as the UN, ADB, World Bank, etc. are crucial at this stage because the government expects their generous help to rebuild victims livelihood in short term and long-term manner. This is the most widespread social problem in the country. Therefore, we have to identify all strategic issues and develop very comprehensive plans to reestablish these victims' livelihood. The Sri Lankan government or TAFREN has been developing a cooperate plan to rebuild their livelihood but no single sociologist and anthropologist represented the policy level. However, these international agencies are well equipped with experts so as to maintain good equilibrium between policy level and implementation. When these agencies offer funds for the government or TAFREN for post-Tsunami activities several

essential factors should be taken into consideration. They are:

1. Identification of the problem
2. Relevance of the problem
3. Total outcome (positive vs. negative, expected change, and manifest vs. latent functions) of the remedial activity
4. Composition of the experts involved
5. Duration of the activity
6. Sustainability of the activity
7. Monitoring system and transparency

These agencies are keen to work with local NGOs and the above conditions are applicable for them too.

Short-term and Long-term Strategies

The all post-Tsunami activities should benefit the affected people only. On the point of view of victims there should be representation of victims perspective in policy level as well as implementation level. Without their views the development practitioners can't gather victims participation. Although the approach consists of PRA, PRT, etc. the success of the developmental efforts need to identify victims perspective. Currently, all affected people have a very high backward and negative attitudes on reconstruction and rehabilitation efforts

launched by any organization. Primarily, they think that this is a merely government duty or responsibility to help them. That is true, but not only the government it should incorporate efforts by all parties.

As far as I concern here, the following activities are essential to overcome this social problem. They can be listed in the table 01.

Conclusion

The post-Tsunami activities are very critical and complex since many groups are bearing different views. Therefore to mitigate these situations all responsible authorities should follow a very important role in this scenario. They are: to stop politicization of post-Tsunami activities, to establish very clear transparency, to prioritize all activities in different levels, to guarantee efficiency of all activities, to guarantee victims complete participation for post-Tsunami activities, to listen to victims needs and attitudes, and to maintain excellent communication between all parties of incorporated effort. Therefore, the ultimate responsibility of the government is to establish social justice to all victims of Tsunami through planning and implementing very comprehensive action plan to overcome this main social problem in Sri Lanka.

Impact of Tsunami on Coastal Fisheries & Future Development

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The catastrophic tsunami event on 26th December 2004 had severely affected the lives, properties, coastal activities and sensitive ecosystems along the coastal belt around the Island. The affected area is relatively thin but reasonably long coastal area over 1000km or two third of the countries coastline. The damage of the catastrophe to the marine fishing industry is enormous.

Fisheries sector of Sri Lanka is of considerable social and economic importance due to various reasons. As a food source it provides 65% of the animal protein consumed within the country. The total fish production in 2004 was estimated at 283,568 tons, of which 30,280 tons were from inland waters. In addition the sector provides 148,000 direct and 100,000 indirect employments, which cater living of nearly one million household dependants. In 2003 fisheries sector gained a substantial foreign exchange (Rs. 9.5 billion) through marine product exports and its contribution to the country's GDP was estimated at 2.6%.

The country's marine fishery could be divided into two main sectors, coastal and offshore. Coastal fishery is conducted in near shore waters basically on the continental shelf and the slope including lagoons and estuaries. Being a tropical country these waters are enriched with high biodiversity, so that the coastal fisheries are characterized by multi-species/multi-gear nature. Coastal fishery resources are consisted of small and medium pelagic fish species like sardines, herrings, anchovies, half beaks, mackerels, barracudas etc. Small pelagics generally form dense schools mostly in upper coastal waters and they are found in high densities in northwestern and northeastern coastal waters. It was also reported that more than half of the national fish resources are found in the northeastern coastal waters. Demersal fish includes species such as snappers, groupers, carangids; invertebrates such as prawns, lobsters, crabs, squids, cuttlefish, oysters, clams mussels and sea cucumbers. Offshore fishery is carried out in the waters beyond the continental shelf up to the outer limit of the EEZ of Sri Lanka and in international waters. Offshore catches mainly comprised of large pelagic species such as Spanish mackerel, frigate tuna, kawakawa, bullet tuna, sharks and billfishes.

Fishery surveys by R/V "Dr. Fridtjof Nanson" during 1978-1980 revealed that the maximum sustainable yield from the coastal zone was 250,000 tons, comprising 170,000 tons of pelagic fish and 80,000 tons of demersal fish. Recent studies have revealed that most of our coastal resources were either optimally utilized or over utilized and only a handful of resources are under exploited or untouched. Therefore, despite the damage caused by the disaster, from management point of view, this is an ample opportunity to formulate a new strategy to take appropriate decisions for sustainable utilization of coastal fishery resources.

Impact of tsunami Humanitarian impacts

The damage owing to tsunami waves is severe in twelve of the fourteen coastal districts, Jaffna, Kilinochchi, Mullaitivu, Trincomalee, Batticaloa, Ampara, Hambantota, Matara, Galle Colombo and Gampaha. The other two districts, Puttalam and Mannar and some places in the Gampaha district experienced least damages. Total population affected due to losses in the fisheries sector was estimated at 800,000, out of which nearly 100,000 were fishers, 80,000 were fish traders, 20,000 were ancillary workers while the rest was their dependents. About 24,572 shelters and fisher houses were completely destroyed, and 8,417 were partially damaged. Around 60,287 fishers were displaced and 1736 disappeared. The death toll of fishermen from all districts was 7222, of which 6429 (89%) were from north and east. A substantial number of people engaged in lagoon fisheries were also affected owing to loss of gear.

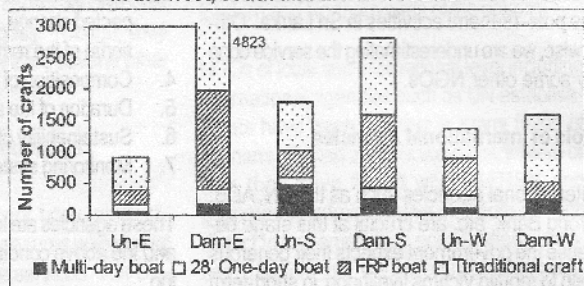
Impact on the fishing fleet

According to the statistics of the Ministry of Fisheries and Aquatic Resources (MFAR), in 2004 the fishing fleet of the country comprised of 31,663 crafts of various types, which includes traditional dugouts such as canoes (west and south), thoni or vallam (north and east), beach seine parus (northwest, west and south), log crafts such as teppam (northwest) and Kattumaran (northern).

They are operated in inshore waters and only few of these are powered by motors and majority are non-motorized. They contributed nearly half (17,030) of the fishing fleet and more than 80% of these vessels are available in heavily affected areas of southern, eastern and northern parts of the country. Fibre Reinforced Plastic (18-23ft) one-day fishing boats powered by 10-25 horse power out board engines are constituted of another 11,559 fishing crafts (37%). They are abundant throughout the country, but more than 60% of them are concentrated in the west and the northwest regions. 28 feet one-day fishing boats are equipped with inboard motors and 1,493 such boats (5%) are in operation throughout the country. A semi-industrialized fishing fleet known as multi-day boats are engaged in offshore fishery. These boats are 30-60 feet in length and equipped with insulated fish storing holds, radio communication systems and satellite navigations. In 2004 this fishing fleet just exceeded 1581 boats (5%).

The damage caused by tsunami on the marine fishing fleet was substantial. Of the total of 31,663 fishing crafts of different types, 16,962 (54%)

Fig. 1 - Impact of tsunami on the four craft categories in the west, south and the east coasts



Un-Undamaged, Dam-Damaged, E-East, S-South, W-West

coastal fishing crafts and 195 (0.6%) offshore vessels were destroyed while another 3839 (12.1%) coastal and 402 (1.3%) offshore vessels were damaged. The boat damage was high in the east coast and it was gradually dissipated along the southern and the west coasts. The affected FRP boats and traditional canoes and that of MDB and 28 feet day boats in the east coast were estimated at 85 and 72% respectively and these were declined to 70 and 60% in the south and to 60 and 30% in the west coasts. Although the percentage of damaged MDB crafts in the east coast was rela-

Table 1 Fishing fleet, craft type, damage and the recovery cost

	2004		Number of boats		Recovery cost (LKR Millions)	
	Fishing fleet	Destroyed	Damage	Craft	Cost ^a	Cost ^b
Multiday Boat	1,381	195	439	1,201	477	
28' Day boat	1,993	485	575	575	363	
FRP boats	11,568	4,293	1,353	1,125	242	
TM	874					
TMM	16,253	9,375	1,878	217	175	
Beach seine craft	1,355	774	372	141	21	
Total	31,237	17,167	4,241	3,457	1,472	

1- Source: Ministry of Fisheries and Aquaculture Resources, 7-Aug, 2005
 TM- Traditional mechanized crafts; TMM- traditional non-mechanized crafts

lively high, there were only 151 such boats worth of 249 millions in the east coast. In contrast there were 250 and 205 damaged MDB boats (worth of LKR 473 and 338 millions) in the south and the west coasts respectively. The 28' one-day damaged crafts in the east, south and the west coasts were valued at LKR 516, 387 and 66 millions and that of FRP boats and traditional crafts were valued at LKR 797, 512 and 175 millions in the respective areas concerned.

It was also noted that the damage was inversely proportionate to the size of the craft; that is the damage in the smallest craft type (i.e. non mechanized canoes) was estimated at 76% and declined to 63% in mechanized crafts, 70% in FRP boats, 53% in 28' one-day fishing boats and 47% in Multi day boats. The repair and recovery cost of destroyed and damaged crafts was estimated at Rs. 3,457 million (Table 1).

In the coastal sector in addition to the registered gear it is customary to possess more than single gear per each craft and this would result in complex craft/gear combinations. Actual information regarding the gear distribution is therefore hardly available. For easy reference the damage was valued at 1472 million (Table 1) based on the assumption that each craft possess only a single gear unit.

In addition to the craft/gear damage, fishing operations were also hindered due to alien obstacles brought into their fishing grounds. For example cast netting in lagoons (eg. Karagum Lewaya) and beach seine operations in certain places in the east coast were temporarily ceased owing to above reason and to resume

fishing removal of such objects and beach cleaning are required

Owing to the adverse effects after tsunami, fisherfolk have been drawn sympathetically considerably from the public and this eased the strict law enforcement against them. For eg. some controversial fishing practices, which were under control, were triggered in numbers after tsunami. The number of purse seine (light course) operators in the southwest region has increased compared to that before tsunami and dynamite fishing has also become a frequent event.

Fish production loss

The anticipated loss of production for the year 2005 due to the fishing craft damage were based on the special and temporal variation of catch rates, monthly production figures of the previous year and damaged proportion of different crafts category. In addition the recovery rate of the fishing fleet was also considered in the analysis. The total loss of fish production in 2005 was estimated at 86,746t with the highest was reported from multi-day boats (37,236t) followed by FRP boats (25,237t), traditional crafts (9,489t), 28' one-day boats (7,680t) and beach seines (8,853t) (Table 2).

The production loss during the first quarter of the year 2005 was estimated at 37,853t of which 19,463t was from multi-day boats, 9,864t from FRP boats, 4,342t from traditional crafts, 2,571t from 28' boats and 1,994t from beach seines. The highest loss in first quarter coincides with low fishing effort of MDB during its peak productive season compared to 15,011t of fish which they produced in January 2003. Although only a few multi day crafts were severely affected, fishing effort remained at a very low level due to reasons such as damages to crafts and gear, manpower restrictions due to deaths of cruise's relatives, unwillingness of fishermen to leave families as they are homeless, idle mentally to engage in fishing, lack of infrastructure and poor marketing facilities. Further, low demand for marine fish consumption have aggravated the situation and fishers tend to make dry fish to minimize the loss and this has caused a glut in dry fish market even six month after tsunami. The shortage of fish production was compensated largely by allocation of the consumer preference to other protein substitutes and refraining from fish consumption. This may have caused a negative impact on recovery phase so that as substantial effort was made to change the people's attitudes to consume fish.

Production losses during the second and third quarters were low compared to the first (19,670 and 14,077t respectively) whereas even with 80%

recovery of the fishery at the end of the year, production loss in third quarter was estimated to be 15,035 tons. The estimated total loss in 2005 (86,738t worth LKR 11,847 millions) is equal to 30% reduction of the previous years fish catch (283,580t). This may cause a drop of the per capita fish consumption from 18.0kg in 2004 to 12.5kg in 2005, unless immediate actions are taken to import the required fish to meet the demand. Further there will also be a drop in the foreign exchange earnings due to low marine fish product exports, however, this may change depending on the recovery rate as it shows a fast recovery than what is anticipated earlier.

The production loss of most finfish varieties was proportional to the craft damage. In 2005, 40,520t of large pelagics, 33,464t of small and medium pelagics and 12,732t of demersal fish worth around LKR 10,847 million would be lost due to tsunami (Table 3). However, there would not be a significant impact on other fish resources like prawns since considerable proportion of the resource was exploited by the trawls operated in loss affected areas of the western and the north western regions. The annual prawn product or therefore would remain around 9,330t and there will not be an alteration of foreign exchange, which would remain around LKR 4000 millions. On the other hand the lobster production in the southern region would soon be recovered since many fishers have resumed their fishing activities due to attractive high-income, prevailing suitable sea conditions for lobster fishery and involvement of economically affordable persons who could provide lost equipments and other accessories required for harvest the resources. It is expected that 1800t of lobsters worth LKR 250 millions would be exploited during 2005.

Based on historical data, Central Bank of Sri Lanka has predicted an annual fish production of 300,000t in 2005 prior to tsunami; however, the expected figures after tsunami would be estimated at around 188,832t of fish worth of LKR 22,197 million (Table 3).

Impact on institutions and infrastructure

Six major institutions of the MFAR were severely affected. The highest damage of LKR 1,703 millions was reported from the Ceylon Fisheries Harbour Corporation (CFHC) where ten out of twelve fully fledged fishing harbours were affected to varying degrees. Breakwater rock boulders were displaced, channels and harbours were silted, so that cleaning up and dredging of the harbour basins is required. Many shore structures and buildings, water supply and distributor systems, fuel tanks, internal roads, slipways need complete rebuilding. Ac-

Table 2 Craft wise annual fish production and loss due to tsunami (Tons)

	Production in 2004	Production in 2005	Production loss in 2005
Multi-day Boats	115,700	77,564	37,236
28' day boats	21,300	15,470	7,680
FRP boats	89,639	65,596	25,257
TM	10,281	3,696	6,586
TMM	5,870	1,029	2,841
Beach seine crafts	13,993	7,135	6,858
TMM (skid)	90,200	10,230	0
Total	283,588	187,225	96,738

TM- Traditional mechanized crafts
 TMM- traditional non-mechanized crafts

other 200 fish landing stages and 37 anchorages along the coastline were also damaged.

Other supportive services like storage facilities, ice plants, cool storages and refrigerator trucks, fish processing centers that operates under the Ceylon Fisheries Corporation (CFC) were also damaged (LKR 380 millions). Cey-Nor Foundation lost their boat yards, sales out lets including gear, whereas Coast Conservation Department (CCD) and Department Fisheries and Aquatic Resources (FARD) lost LKR 505 million worth their regional offices, stores, workshops, heavy equipment, vehicles, marketing network and radio equipment etc. NARA and NIFNE have also been severely affected by tsunami waves including research labs, databases, museum, research and training vessels, buildings etc. The damage was estimated at LKR 473 millions.

Recovery and development

Immediately after the disaster, with declaration of need assistance, local authorities and communities responded quickly by providing immediate needs of the people. This involves supply of food, clothing, temporary housing, medical and education services. Simultaneously the government has taken prompt actions to assess the damage and to provide assistance to tsunami victims.

The MFAR has initiated necessary actions for rebuilding the industry on short and long-term basis. Short term or phase I activities ensure the humanitarian and social complications are solved. Repairing of damaged fishing boats, replacement of destroyed fishing boats, outboard motors, fishing gear and equipment will also be accelerated on the same basis. Long term or Phase II activities will proceed as a continuation of the phase I and would extend over next four years. This will focus on improving livelihoods of fishing communities beyond the pre-tsunami levels and promoting economic stability. This includes series of development activities including raising fresh fish production, value added fish and fishery products, construction of massive scale fisheries structures, supplying improved boats/equipment and ecological conservation. The preliminary estimates of financial needs in recovery of fisheries sector was estimated at around LKR 11,300 millions (without housing and social services) of which 1264 millions are required for short-term activities and 10,536 millions for completion of medium and long-term initiatives. However, in the fisheries sector the implementation plan has highly over-estimated figures and describes the rehabilitation programme under seven major project com-

Table 3. Annual fish production and losses due to tsunami

	2004		2005		2005	
	Production	Values (m)	Production	Value (m)	Loss (t)	Value (m)
Large pelagic-offshore	110,000	13,200	74,733	8,968	35,267	4,232
Large pelagic-coastal	12,800	1,536	7,546	906	5,254	630
Medium pelagic	10,200	1,084	5,604	598	4,596	486
Small pelagic	80,418	8,042	51,530	4,857	28,888	3,185
Demersal	39,870	6,348	27,138	4,235	12,732	2,114
Inland	30,280	3,634	30,280	3,634	0	0
Total fish production	283,568	33,844	196,832	23,197	86,736	10,647

Values were estimated based on the price at landing

ponents as described below.

1. Construction of permanent houses for fishermen. Under this component 30,850 houses will be restored/rebuilt and distributed among tsunami affected fisher families who lived within the 100m coastal belts from the shoreline. Three housing categories; single, twin and flats worth of 13882, 12340 and 15425 millions are to be completed by the end of 2005.

2. Rehabilitation of harbours, anchorages and landing stations. Commencement of rebuilding and restoration of harbours and infrastructure is a priority issue. All harbours should be properly designed and modified for future needs and should be equipped with fish landing facilities to minimize the post-harvest losses during landing. Ice plants to provide ice for multi-day boats, fish transportation and cold storages to store the fish during gluts in fish catches should also be made. Other structures like boat yards, sales outlets, marketing network and radio and other communication facilities should be developed within the harbour territory. Fish curing, processing and canning facilities should be developed in the vicinity of fishery harbours and landing sites. A properly functioning coast guard and a surveillance system should also be developed.

The financial requirement of this project would be approximately LKR 19,962 millions of which LKR 11,976 millions are required for reconstruction and rehabilitation of eleven harbours (1,100 for modification of Kirinda and Panadura harbors and 9,000 for construction of Dikkovita fishery harbour), 5,794 for construction of 34 anchorages, 1,342 for up grade harbour facilities including vehicles, office equipment and staff accommodation, and 850 for repairs and purchase of heavy machinery including 3 dredges, 20 cranes (40-50T), 12 dump trucks and 10 wheel loaders.

3. Repair rebuilding and replacement of damaged/destroyed fishing crafts and gear. The total allocation for this component will be around LKR 5,775 millions of which 3569 for replacement of crafts, 414 for repairs, 178 for engines and 1614 for replacement of gear. During the restoration programme priority has been given to repair the destroyed traditional crafts and FRP boats, enabling maximum number of fishermen to resume fishing in shortest time possible. Around 37 repair

centers were established in collaboration with private boat yards and special work teams were appointed for repairs while mobile repair units provided engineering services. A portion of materials required for renovation of crafts was provided by Cey-Nor while the fishermen or the donor agencies pro-

vided the rest.

A number of foreign teams, various donor agencies and NGOs voluntarily provided their assistance to repair and provide new fishing crafts and other accessories, which accelerates the reconstruction programme than anticipated. However, in certain instances they worked independently without proper coordination with responsible agencies, resulting an alteration or over replacement of the fishing fleet when compared to the pre-tsunami level. Further the project aims at completing the studies for fishing boat design and promoting the pilot activities for building of improved multi-day fishing boats.

4. Revitalizing the collection, storage, distribution and marketing network. The established fish collection and distribution system was collapsed due to loss of storages, vehicles and other supportive structures. During the disaster 10 cold storages and 18 ice plants were completely destroyed while 5 storages and 12 ice plants were severely damaged. Since fish is highly perishable, providing storage facilities and continuous supply of ice will not only ensure the supply of quality fish to consumers but also will help to maintain a demanding fish market to securing livelihood of affected fishermen. It was planned to reconstruct 12 ice plants and 6 flake ice plants at various locations. Until the permanent structures are established, immediate requirement is to provide 10-15 containerized ice plants, 20-30 numbers of freezer trucks and 10-20 refrigerator trucks of varying capacity to the affected areas. Total budget would be around LKR 1000 millions.

5. Rehabilitation and reconstruction of training, research and management facilities. The project aims at constructing buildings, workshops and equipment for AD, FI and CCD offices, supplying rescue boats, radio communication equipment for monitoring control and surveillance division in Galle, reconstruction of training/research vessels, at head office and the regional offices of NARA and NIFNE. Total budget was estimated at LKR 1000 millions.

6. Rehabilitation & reconstruction of community infrastructure & social development.

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Necessity & Concepts of a Comprehensive Disaster Management Plan for Sri Lanka

Dr. Ranjith Premalal de Silva

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Natural disasters are inevitable and it is almost impossible to fully recap the damage caused by a disaster. Some disasters occur instantaneously and some others have a slow onset. Most of the disasters which have a slow onset can be predicted early and remedial or mitigatory measures drawn out. However, the occurrence and the location of instantaneous disasters like earthquakes cannot be predicted presently and therefore, the consequences can be very serious. The urgent need to include natural hazard information routinely into development planning themes has been emphasized especially after the recent devastating tsunami.

Disasters can be divided into different categories based on the main controlling factors leading to a disaster. These may be meteorological (tropical cyclones, floods, droughts), geomorphological/geological (earthquakes, landslides), ecological (forest fires), technological (chemical explosions like in Bhopal), global environmental (sea level rise), and extraterrestrial (meteoroids). Another useful distinction can be made between disasters with respect to the duration of impact and the time of forwarding. Some disasters like earthquakes strike within a short period with devastating outcomes while others may have a slow onset period (drought) with equally or more serious repercussions. The real magnitude of a disaster i.e. the value of all losses inflicted as well as of those suffered in its aftermath is an actual realization of a possible risk scenario which needs to be taken into account in planning for rehabilitation and reconstruction. The risk representing the value of all potential losses that may be caused by a hazardous event is in turn calculated as a function of the magnitude of the event and by our ability to cope with its impact or vulnerability.

In the nomenclature of disasters, man-made disasters and natural disasters are identified as two main types because the management intervention can be completely different in these two cases prior to the disaster. However, in this article the focus is mainly on natural disasters.

Hazards exist in nature. A hazard can be

defined as a source of potential harm or damage, or a situation with potential for harm or damage. Poor understanding of the hazard leading to poor management could turn a hazard into a major disaster. For example, in Japan, tsunami is no longer a disaster but just a hazard as Japanese are well equipped with comprehensive management strategies for tsunami. However, a single episode of tsunami brought us a widespread disaster. This clearly shows the need for a comprehensive disaster management structure for the country.

Concepts for Disaster Management Plan

Most of the disaster management strategies are biased towards post-disaster management. There should be a proper balance between pre and post disaster management and prevention of a disaster is always better than mitigation of its impacts. Figure 01 shows the typical disaster management cycle.

A disaster management plan should definitely include:

- Disaster preparedness and public awareness
- Early warning and hazard mitigation
- Emergency response, evacuation, and control
- Impact assessment, social and welfare services for relief and rehabilitation, and reconstruction
- Disaster mitigation

Disaster Preparedness and Public Awareness

It is important to have all possible hazards identified through scientific studies and track records of the possible magnitude of the hazard, geographical extent of impact, time of possible occurrence or

recurrence (if possible), probability of occurrence and the nature of impact to evaluate the potential risk of the disaster. A hazard with a very low probability can result severe and widespread impacts while a high probability drought, which is mild and local can only result in a slightly lower yield of crops. The evaluation of hazard in terms of its probability and impact is a fundamental concept in disaster preparedness and it is shown in Figure 02.

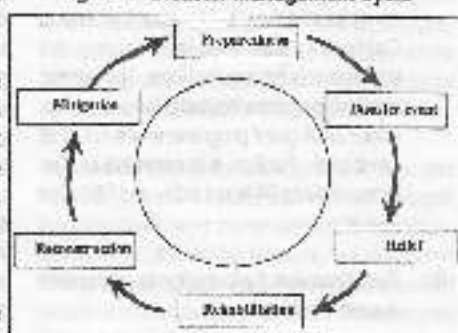
We have experienced a colossal human disaster with tsunami. As professionals we cannot be silent witnesses to another tragedy. Along with the relief, rehabilitation and reconstruction, we need to focus our attention on the mechanism for enhanced prediction capability and preparedness in meeting emergencies. All these pre-disaster preparedness plans could be formulated based on our experience gathered from the last event.

"Have we collected the necessary data and information for such planning?" To my knowledge, not a single map has been produced to show the area affected, shoreline changes, spatial distribution of the impacts based on administrative units (Grass-Rooted Divisions, Divisional Secretariat Divisions). In addition, scientific investigations should be conducted and necessary data should be gathered to explain the answers to these questions: "Why is it that some areas were not affected?", "Why is it that some structures were not damaged?", "Why is it that in some areas the tidal waves were 20-30 meters high while in other areas it was 2-3 meters?"

The success of disaster preparedness mainly depends on the collection of the necessary information. Once the potential risk of a disaster is evaluated, a comprehensive preparedness plan should be drawn out considering the early warning system in place and risk monitoring mechanisms.

No disaster preparedness plan will be successful unless people are properly informed of the potential risk and the preparedness mechanism. Public awareness should be an integral component of any such plan. Electronic and print media and the communication

Figure 1 - Disaster Management Cycle



networks have a major role to play in creating awareness among public.

However, it should be understood that during a disaster, regular communication mechanisms get damaged and surviving links get congested due to an abnormally high volume of traffic. Without communication facilities, relief and rehabilitation work get seriously affected. Proper planning is required to avoid breakdown of communication links and recovery in case of breakdown in the shortest time. Even during non-disaster periods, communications between different agencies and the public is very important. These include telemetry of disaster related data for processing, administrative communications for planning and educating public with respect to disaster preparedness.

Public education can be efficiently addressed through the media to inform people how to prepare for disasters, make people knowledgeable about the event, convey warnings about natural hazards and provide information continuously throughout the course of a disaster. As different types of disasters have different vulnerable zones, the public awareness program has to be location specific in terms of content and language.

The success of a public awareness programme depends on the confidence of the public on the information source or the media. If a forecast fails, the public should be informed about the true status of the incident with a genuine acceptance of the mistakes made.

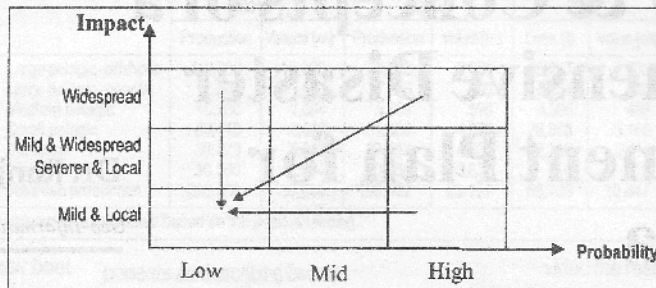
After potential disaster areas are identified, agencies need to transport equipment for rescue and resources for relief and store them at the locations, which are accessible in a short time. Both government departments and NGOs need to have communications for such planning and movement.

Forecasting and Early Warning

Forecasting is one of the most important components of a disaster management plan. It is possible to make predictions for some disasters but the technologies available today are still not capable of predicting the occurrence of earthquakes.

Analysis and forecasting consist of data acquisition for analysis and data dissemination. The mandate of each organization linked to the disaster management plan should be clear with respect to these two activities. A considerable

Figure 2 - Two Dimensional Representation of Risk Evaluation



amount of national wealth has already been spent on acquiring sophisticated equipment to universities and research organizations for data acquisition and dissemination. It is obvious that our training and education efforts have not been very fruitful on these lines. Moreover, most of this equipment has become personal properties of individuals and the intended benefits would never be delivered to society.

Data acquisition is the process of gathering relevant information from various sources and delivering them to the processing centre. Processing can be performed at local, national or even regional level. The required dynamic and time series data could be conveniently collected through the use of satellite technology. In an era where continuous monitoring of the entire earth is carried out from space, collection of data is by no means costly. United Nations Office for Outer Space Affairs in Vienna has pledged to provide whatever assistance to develop a proper, timely data collection mechanism, which will be a continuous process. A communication link could be developed to send the collected data to the processing centre on real time or near real time basis.

Early Warning System

A good early warning system requires the following characteristics:

- (a) Production of early warning in an appropriate form

Although we have a seismic monitoring station in Pallekelle, Kandy to collect the information of the behaviour of ground waves, expertise is not available locally to process the data and generate the required information on the strength of an earthquake. There is a considerable time lag to send the data to California, USA and in receiving the information in the required form. The seismic monitoring stations located in the universities under JICA grant programme are not at all functional. Further, it is essential to man these stations 24 hours a day and 365 days a year.

- (b) Rapid transfer of information to appropriate decision-makers

There should be a direct link to the relevant decision makers with the data collecting agency. However, it is not possible to have effective communication links with several related ministries. Therefore, the Disaster Management Centre should be the coordinating body among the related line ministries. We realized in the

immediate post tsunami period how ineffective our national disaster management centre was and how much resources in our social services budget have been wasted on this centre. The Disaster Management Centre needs to be strengthened with qualified personnel who are exposed to the advanced technologies of disaster management.

- (c) Preparation and dissemination of suitable advice to likely to be affected parties and other relevant groups

Forecasting or advanced warnings should be sent to the government agencies, non-governmental organizations and communities in areas likely to be affected, through the media so that they may take action to prepare for a disaster. Relief agencies should also be notified on the scale or the magnitude of the event and the possible spatial extent of the distribution of the calamity. However, advanced preparedness exercises need to be previously introduced in order to be prepared for a debacle.

Emergency Response, Evacuation, and Control

A key challenge after a disaster is managing the response. This has been compared to planning a military campaign – one needs to get trucks, material, communications, medicine, and other urgently needed items into the theatre as quickly as possible.

An Emergency Disaster Events Database needs to be developed and maintained in order to provide data on all disasters in an effort to provide reliable, objective information for vulnerability assessment, policy formulation and research by governments, disaster mitigation organizations and academia. Regarding the recent tragedy, the database should include the spatial distribution of the arrival time of Tsunamis, encroached distance, affected population, number dead, injured and homeless and estimated economic damage, etc.

Such a database would facilitate the increased exchange of emergency management information to improve the emergency management practices, thereby reducing disaster-related losses of life and property, and easing social disruptions. Further enhanced international communication about emergency management would foster development of international standards for terminology, equipment, monitoring, operating procedures, training and organizational structures. Improved coordination of international responses to disasters would assist us to shift from crisis response to a measure of emergency management. Technology transfer from the developed world should be facilitated and an international information network would provide a common platform to support distribution of new technology in Sri Lanka. This would prevent us agonizingly struggling with disaster in isolation as we experienced throughout the littoral areas of the country in the aftermath of tsunami.

Disaster management plan should link all the institutions and agencies which are equipped with individual emergency response strategy. For example, Fire department has its own formulated strategic approach to cater an emergency related fire. A comprehensive management plan covering all these institutions and agencies should ensure that a planned evacuation and disaster control regime is evaluated and can be effectively put into use within a short period of time. Inter-agency coordination should also place a high importance on the management agenda as coordinated efforts have proven to yield better response.

- Acquisition of prior knowledge of risk faced by the community in disaster situation, identifying vulnerable and safe areas.
- Establish and sustain optimal technical monitoring and warning service for disasters, in all relevant institutions, linked to the international network.
- A strategy to ensure dissemination of information about disasters in an understandable way to those at risk.
- Ensure knowledge, public awareness and preparedness to act in disasters.

Social and welfare services for relief and rehabilitation

The real magnitude of a disaster, i.e. the value of all losses inflicted as well as of those suffered in its aftermath is an actual realization of a possible risk scenario which needs to be taken into account in planning for rehabilitation and reconstruction. The risk representing the value of all potential losses that may be caused by a hazardous event is in turn predicted by the

magnitude of the event and by our ability to cope with its impact or vulnerability.

Although budgetary allocations for a properly constituted and financed social and welfare service programme are in abundance in the country after the tsunami disaster, we witness that the social welfare mechanism of the government experiences a considerable delay in launching their planned activities for relief and rehabilitation. Individual and non-governmental volunteer organizations are quick to respond to immediate needs of relief and rehabilitation activities.

There is no argument that any post disaster construction should evaluate the potential recurrence and the location of hazardous zone prior to make any decision on reconstruction.

In the case of December 26 tsunami, imposing buffer zone of 100m in the south and 200m in the east is to restrict the post disaster construction activities in a safe zone. However, the identification of risk free zone required a comprehensive vulnerability analysis scaling the possible physical intensities of impact and the degree of exposure to the disaster.

In view of this, space technologies such as Remote Sensing and Global Positioning Systems (GPS) coupled with spatial data management systems like Geographical Information Systems (GIS) could provide detailed knowledge and information base required for early warning strategies, preparedness plans, relief, rehabilitation, reconstruction activities and mitigation efforts.

Risk evaluations to prepare vulnerability maps of designated areas (e.g. 2 km from shorelines) for specified levels of hazard is another key application area of land resource satellite data. Identification of vulnerability status requires a variety of spatial data products such as topography and use, geotechnical characteristics of the ground, engineering characteristics of buildings & infrastructure and most of these data can be acquired from space satellite platforms. Even when direct estimation or evaluation is not possible, proxy indices derived from satellite data could be effectively used. Further, vulnerability of a community to a particular disaster is a dynamic entity and needs to be updated regularly. Satellite data available on optical bands, infra-red regions, thermal and microwave lengths and also active sensor systems such as RADAR could provide dynamic data libraries for this purpose.

Vulnerability decreases with improved design and construction practices and also with more reliable infrastructure and communication facilities. Conversely, during the tsunami, we witnessed how vulnerability increases in areas of unplanned growth of human habitations, social and economic

activities, immediate or the lurking threat of natural hazards.

Satellite data on a proper GIS platform could provide the information base for vulnerability criteria in planning, rehabilitation and reconstruction. It is evident that vulnerability assessment requires a very careful synthesis of a large number of factors on the environment.

Geographical Information Systems which are capable of assembling, storing, manipulating and displaying geographically referenced spatial information now make it possible to attempt such a synthesis and test the feasibility of alternative proposals.

Disaster Mitigation

Most disasters cannot be prevented and hence, impacts are obviously found and needed to be mitigated.

Any natural hazard associates with a possible risk and it is actually realized by the value of all losses caused by disaster (magnitude of the disaster) and by those who suffered in its aftermath. Potential risk of hazard is calculated by the magnitude of the hazardous event and by our ability to cope with its impact (vulnerability), if it becomes a disaster. The logical and most optimistic goal of disaster mitigation is therefore risk reduction.

Quantitative assessment of risk provides a rational basis for risk reduction. Proper risk assessments reveals away to reorient current strategies prevalent in this country so as to shift the focus from the highly expensive post-disaster rescue and relief operations to cost effective planned actions aimed at creating knowledge based hazard resilient public assets.

In fact, the developed world has enough knowledge to reduce risks posed by natural hazards and thereby minimizing their harmful impacts. For example, a magnitude of 7 earthquake that rocked California in 1998 caused fewer deaths. By contrast, the 6.3 magnitude Maharashtra earthquake of 1993 killed over 10,000 people. This clearly shows where the developing world and developed world stand in terms of disaster risk reduction.

Risk Reduction

Specifically, three phases can be identified to define disaster mitigation goals; one before the event, second in its immediate aftermath and the last in post disaster period.

The first phase tasks could be collectively called as advance planning and it consists of

- a) creating a knowledge based hazard consciousness at all levels to foster such as hazard resilient land use, siting and construction practices
- b) preparations to cope with an imminent hazard by measures such as setting up of possible early forecast and warning systems

In the immediate aftermath of a disaster, quick delineation of all salvageable lives and supporting systems at risk, search and rescue, evacuation, medical assistance, food and shelter, etc. should be accomplished to reduce risk. The modern technology available at present such as space based surveillance systems and computer simulations can be used successfully to direct timely and more efficient rescue and relief operations.

Finally, it would be needed to produce risk maps and figures which will provide basic direction for planning reconstruction and rehabilitation activities.

Risk Assessment

Risk maps and figures are two basic inputs used in the decision making process at various

stages of the risk or disaster mitigation activities. In this process, we obtain maximum estimate of losses (risk) that may possibly accrue in the wake of a hazardous event. Risk evaluation in a given region could be done in three steps.

1) Evaluation of hazards

This is expressed in terms of the spatial distribution of exceedingly possibilities for a specified level (threshold) of environmental disturbances (ground motion, atmospheric temperature, pressure, precipitation, wind velocities) over given future time periods. Several maps can be therefore, generated for different disturbance thresholds and future time windows.

2) Preparation of vulnerability maps

The second step in risk evaluation is to prepare vulnerability maps of designated areas for specified levels of hazards. This is a heavy task and requires detailed information on topography, land use, geotechnical characteristics of the ground, and engineering characteristics of buildings and infrastructure facilities. The modern Geographical Information Systems (GIS) are capable of assembling, storing, manipulating and displaying massive quantities of geographically referenced

information. Therefore, it is possible to test the validity of many alternative schemes. The basic GIS can thus be progressively enriched to construct and test realistic model of vulnerability.

3) Preparation of Risk Maps / Figures

Finally, suitable risk maps/figures can be produced by combining the hazard and vulnerability maps in an appropriate manner.

Our Expectations

From the experience of tsunami disaster, a organisational framework has been proposed by the government to cover all aspects of disaster management. This includes Inter-Ministerial Committee for Disaster Preparedness and Management, Disaster Mitigation Authority, National Disaster Response Force, and National Disaster Management Centre. It is the responsibility of scientists to contribute to the efforts of developing comprehensive management strategies to protect our nation from future disasters and it is the responsibility of everybody to be aware of the impending disasters and follow the safety guidelines, regulations and instructions to be safe from natural disasters.

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Reconstruction of damaged community infrastructure facilities is essential for upliftment and development of the fishing community. The project aims at rehabilitation and reconstruction of community centers, pre-childhood development centers and welfare facilities. The project also includes special counseling programmes for physically handicapped and orphaned children and also for mentally distressed people due to tsunami.

7. Rehabilitation of the coastal areas. Coastal habitats and ecosystems such as mangroves, coral reefs, land vegetations, agricultural lands, sand dunes, beach stretches and lagoon mouths have been affected by tsunami in varying degrees. The affected coastal zone and coastal environment will be restored via rehabilitation of the affected ecosystems and deploying preventive measures for minimizing erosion through establishing and rehabilitation of coastal protection structures. The proposed project will be carried out by the CCD and approximate cost would be around LKR 1,669 millions.

Financial assistance, implementation and monitoring

Most of the financial requirements would be provided through NGO's, foreign governments and multilateral organizations. Some grants that

are provided as either materials/goods or cash subsidies would be utilized for repairing/replacing boats and gear.

MFAR would be the focal point that implementing this programme. However, a separate body, Project Implementing Unit (PIU), will be established aiming to functioning the mechanism smoothly and efficiently. MFAR would act in national level, fulfilling the financial needs where necessary, providing facilities and required personnel for IPU and developing improved communication between the Ministry and the community. Provincial level officers of MFAR would play an important role in supporting the PIU in provincial level activities by ensuring speedy convey of decisions taken by the Ministry. District and divisional level district administrators, NGO's and private sector companies would take part in implanting the programme. Fisheries communities and fisheries cooperatives will also have a decisive role in planning and implementing the programme. Programme Monitoring and Evaluating unit would also be established to assess the achievements and impacts of the Rehabilitation and Development Programme and this would act independently but in collaboration with PIU.

Conclusion

The reconstruction and rehabilitation programme would not only restore the pre-tsunami production capacity, but also it would ensure the upgrade the

sector and diversify and enhance the livelihood of affected fishing community. In the absence of details of damage by tsunami, it is impractical to estimate incremental benefits from the programme, however, based on the damage to equipment and loss, it could be predicted that the increment output, improved efficiency and enhanced product would add at least 30 percent to fisheries output in the affected areas. Much of this could be generated in early medium-term and it is anticipated that investment cost would be economically justified within the ten years of programme initiation.

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Human Development in a Knowledge-Based Society

Sri Lankan Scene*

Dr. Saman Kelegama

The book is an outcome of the proceedings of the Annual Sessions of the SLEA in mid 2004 and includes 10 Chapters, which are divided into six Parts. Each Part links Human Development to a specific area of economic progress, viz., poverty, growth, services (financial), education and health, technology and productivity, and competitiveness. Some Parts are accompanied by comments from discussants but some do not carry comments. After the Preface by the editor, the book begins with Chapter 1.

Chapter 1 by the editor is on Human Development and Poverty. After presenting a critique of the Human Development Index (HDI) (used by UN Human Development Reports), the author uses Sri Lankan data on HDI and poverty to show that high HDI does not necessarily mean that poverty has reduced. The author goes on to show that combating poverty needs specific policies such as rural development centred around agriculture, promotion of small and medium enterprises (SMEs), etc., and this is the most effective way to enhance human development, which in turn, will lead to greater employability and productivity.

In Chapter 2, Rohman Sobhan, shows that addressing poverty needs a totally different new approach from the conventional wisdom. He bases his argument on the failures of the Bretton Woods Institutions led structural adjustment packages (and later Poverty Reduction Strategy Papers (PRSPs)) to effectively alleviate poverty. He argues that structural injustice in distributing productive assets, marketing, human development programmes, and governance remains the major source of poverty and exclusion. It is not by programmes that target the poor that poverty could be eradicated says the author, but by democratizing development by directly integrating the poor to the growth process. After providing a comprehensive critique of PRSPs, Sobhan presents a new programme to eradicate poverty and calls for a new generation of pro-poor structural reforms.

In Chapter 3, Nimal Sanderasinghe examines the Growth-Human Development debate and argues that both are needed for enhancement of each other. High growth alone cannot enhance

Human Development as shown in some Middle East Countries and during the early years of economic liberalization in Sri Lanka. Growth is only a means to achieve an end, i.e., human development. The author argues that in Sri Lanka, high achievements in human development did not contribute to low growth, but it was wrong policies and external shocks that contributed to low growth. In any case, the author argues that growth has to be sustainable if it is to make a contribution to enhance human development and the quality of growth matters, as the 1995 UN Human Development Report has cogently articulated. Sri Lanka's recent pattern of growth with increasing inequality underscores the need for more broad-based and sustainable growth.

Theraniwara, in Chapter 4, addresses the importance of the delivery of financial services to alleviate poverty and enhance human development. While the shift of the resources from surplus sectors to deficit sectors could bring financial services closer to the poor, for them to reach grassroots levels some innovation in financial delivery is necessary. This is because there is a low demand due to the low purchasing power of the poor and this discourages supply of financial services by the private sector. Moreover, the well known problems of moral hazards and adverse selection further discourage generous allocation of financial services to the poor. It is in this context that innovative schemes such as micro-credit programmes, Grameen Model based lending, etc., become important and the author argues that they have to go hand in hand with other pro-poor delivery services to make an effective impact on reducing poverty.

In Chapter 5, Swarna Jayaweera argues that the multi-dimensions of Human Development indicate that the inter-relationship of education with political, economic and socio-cultural environment is crucial to the success of education as an agent of total development process and presents a six-point programme on education reform. The challenge in the area of human development, is to provide employment-oriented training in two tiers of vocational institutions distributed equitably in districts, i.e., (1) between general education and employment, and (2) between University education and employment. It is argued that career guidance

counsellors should work in close association with district training centres and national education bodies to meet the challenge.

Days Samarasinghe, in Chapter 6, argues that the health sector reforms are necessary with emerging new problems and increase in demand for health services with technology, social, demographic and global changes. The post-1977 health reforms attempts of 1980, 1990, 1997, and 2003 have not been very successful due to inadequate consultation with stakeholders and inadequate public and parliamentary debates. Samarasinghe argues that for reforms to be successful: (a) recommendations should be prioritised and implementation plans should be well developed; (b) timing of implementation should preferably be in the early years of a government in office; (c) reforms should be well organized and market the reforms through active public debate; and (d) the political leadership should strongly support reform. Samarasinghe concludes by stating that all is not lost. Some reforms appear to be successful to the extent of having a snowballing effect, others are being implemented but need close monitoring and fine-tuning while some others are in the drawing board subject to critical analysis.

Development of Information Communication Technology (ICT) to assist the poor is the theme of Chapter 7 by V.K. Samaranyake. The author highlights some of the existing ICT programmes such as JooNet, Cyber Trade, Sri Lanka Bureau for Foreign Employment Website, Govi Sahasaya Programme, Multi-Purpose Tele Centre (Sarvodaya), etc., to assist the lower middle class and poor people. However, the author argues that these programmes function in an isolated manner and do not follow an integrated national effort and are therefore inadequate to meet the challenges of poverty. The author identifies governance, education, health, and agriculture, as the four areas where ICT can help poverty alleviation and some of the innovative educational practices (based on the Petersburg Prize) in these areas are highlighted. The author argues that a number of ICT issues which fall within many Ministries have to be resolved before

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Changes in China Tea Industry and its Implications for Sri Lanka

Su Zhucheng & L.H.P. Gunaratne*

China and Sri Lanka are two major tea-producing countries in the world. Tea industry plays a crucial role in Sri Lanka's economy, which accounts for more than 3% of the total GDP and is the second largest earner of foreign currency after garment industry. In China, although tea industry can't get the same status in economy as in Sri Lanka, it is still important for some remote mountainous areas of Southern China where alternative earning opportunity is very rare. It has been publicly known that there is no competitiveness between Sri Lanka and China as their two countries produce different categories of tea that cater to different segments of the world tea market. However, in the trend of globalization, to some extent, markets are integrated in various ways. Therefore, changes in tea markets in either China or Sri Lanka will influence its counterpart. In recent years, there have been many changes occurred to China's tea industry with social transformation, and these trends will probably give rise to some opportunities for Sri Lanka's tea industry.

In fact, Chinese import of black tea from Sri Lanka is gradually increasing. China imported 473 metric tons of Sri Lanka's tea in 2004, as against 170 metric tons in 2003. The figure in 2005 also shows the momentum for Sri Lanka's tea to go into Chinese market. According to Chinese Custom, during the first half of 2005, approximately 381 metric tons of Sri Lanka's tea entered China, worth \$1.04 million. These figures rose by 49.83% and 35.4% respectively, compared to the corresponding period in 2004, and account for 31.2% and 34.2% of the total amount of Chinese tea import and its value in this period. In addition, some Sri Lanka tea producers are marketing their own brands, such as Mabroc, and attracting attention from more and more consumers in China.

Current Trends in China's Tea Industry Structural Change of Tea Categories

China produces diverse categories of made tea. Based on the similarity of key technology

adopted in processing, there are six basic groups, namely green tea, black tea, yellow tea, white tea, Oolong tea and brick tea. Brick tea is also called dark green tea and is usually manufactured in shape of cake or brick. Pu-er tea is one member of dark green tea group.

Table 1 shows that the extent under tea was stable from 1980s on, but output gradually increased, which was contributed by various tea categories at different rates. Table 2 lists three major categories of Chinese tea and the changes of its proportion as in the total output in the last two decades. There are some obvious trends in the last two decades according to the Table 2. First, green tea group was consistently growing and dominated the production of Chinese tea. It is believable that most of tea lovers in China will still be in favor of green tea, which will support green tea group to continue its dominant status in China's industry for long time. In addition to its growth of green tea group as a whole, the green tea group in domestic market has been undergoing great changes. The consumption of traditional green tea dropped sharply which is now mainly for export, instead, more and more people consume hand-made green tea in their daily life. This hand-made green tea can usually enjoy high price.

Secondly, the production of black tea group declined sharply from 25% of total output in 1984 to 5.2% in 2003. Before 1990s, China was in urgent need for foreign currency, and black tea accounted for more than 70% of the total trade volume in the world tea market. So, for the purpose of earning foreign exchange, Chinese government encouraged export of black tea through subsidy. The subsidy policy stimulated the production of black tea and helped to win a substantial share of the world black tea market by the strategy of low price. After the termination of export subsidy in 1990s, it was very natural for a big reduction of production of black tea, because the quality of China's black tea is not competitive in comparison with other countries, such as that in Sri Lanka.

The Table 2 further shows that, despite the stagna-

tion of growth in recent years because of the limitation of the extent, the output of Oolong tea has increased by 600% from 1984 to 2003. Oolong tea group is booming at this moment in China's domestic tea market. Japanese market is also in great demand of China's Oolong tea. Some market surveys indicate that the taste of Oolong tea can meet different consumers from young generation to old one, including some persons who originally didn't like drinking tea. So, Oolong tea possesses a potential to increase its production in the future. The continuously increasing price of Oolong tea may be supposed to support this prediction.

Of the other types of tea such as brick tea, yellow tea and white tea groups, Pu-er tea should be of concern, which belongs to dark green tea group. Although these groups' proportion as a whole in the national output halved during the last two decades, the demand for Pu-er tea and its production is slightly increasing now. There are some experiment results showing that Pu-er tea has physiologically positive effect on health, such as reducing accumulation of fat in blood vessel. This fact is used to promote its consumption in China and some other regions in Eastern and Southern Asia and Europe as well. However, Pu-er tea has a special flavor which is not preferred by most consumers and it is now used only a small number of consumers.

Changes to Exporting Sector

As shown the Table 3, Chinese tea exporting volume and domestic consumption increased by 120% and 170% respectively from 1982 to 2003. This indicates that the growth of Chinese tea industry be motivated by both domestic and international demand. In fact, domestic market plays a crucial role in the development of Chinese tea industry. Although the exporting volume in 2003 has doubled in comparison with the beginning of 1980s, Chinese tea industry as a whole has gotten only a little benefit from it if taking the factor of exporting price into consid-

Table 1 - Tea Output and Extent in China

Year	1982	1985	1988	1991	1994	1997	2000	2003
Area('000 hectare)	1,126	1,071	1,082	1,060	1,135	1,076	1,090	1,190
Output(kg mn)	421.4	455.5	569.0	541.6	588.5	613.0	676.0	770.2

Source: Agricultural Ministry, China

Table 2 - Proportion of Different Tea Categories in Total Output, China

Categories	1984	1990	1994	1997	2000	2003
Green Tea	51.3%	60.0%	68.4%	72.3%	72.9%	74.2%
Black Tea	24.9%	20.0%	12.8%	8.0%	6.9%	5.2%
Oolong Tea	2.3%	6.0%	7.4%	9.2%	9.9%	10.6%
Others	21.5%	14.0%	11.4%	10.5%	10.3%	10.0%

Source: Agricultural Ministry, China

Note: Others includes brick tea, yellow tea and white tea

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Table 3 Export and domestic consumption of Chinese tea

Year	1992	1995	1998	2001	2004	2007	2002	2003
Domestic consumption	154	253	319	311	332	411	455	500
Export	15	147	238	188	186	200	243	260

Source: Customs Bureau and Agriculture Department, China

Table 4 Average price of Chinese exporting tea

Year	1992	1995	1998	1999	2002	2001	2002	2003	2004
Exporting price	2,352	2,147	2,718	1,758	1,740	1,375	1,315	1,410	1,388

Source: Customs Bureau, China

cration. The Table 4 indicates that, from 1992 to 2003, the exporting volume increased by 33%, but the value declined from 413 million US dollars to 357 million.

What explains the poor price of Chinese export tea? As we know, China's green tea dominates international green tea trade. In other words, China's tea industry has a strong market power with regard to the green tea trade in the world. In addition, green tea dominates the total tea exports in China, as shown in the Table 5. Furthermore, green tea targets only a few regions of the entire global tea market, which is mainly located in Africa and few European countries. Based on these factors, it is very obvious that, when export volume grows faster than demand, price goes down.

Development of Ready-to-Drink Tea and Extraction Product

The demand for Ready-to-Drink type product exists mainly among the young generation. In

one billion US dollars.

In addition to ready-to-drink tea, the sector of extraction and purification of components from tea material is also developing quickly. One of them is the industrial production of polyphenol. The capacity producing polyphenol in China is about 5,000 metric tons annually and exceeds about 30,000 metric tons of tea material. Now, a sub-industry in association with ready-to-drink tea and component extraction is gradually forming. This may be technically depicted in Figure 1.

Implication for Sri Lanka Tea Industry

Generally, tea leaves produced in Sri Lanka has more polyphenol content, which fits better black tea. On the contrary, tea leaves in China is suitable for green tea for its relatively low polyphenol content. This difference of production pattern is determined by two factors, mainly climatic condition and types of tea clones. Of them, climatic condition plays a decisive role, because the same variety will lead to change in chemical component

ing, but its supply is being limited by output in China. This semi-fermented tea group consists of Oolong tea and Pu-erh tea etc. The essence of fermenting technique in tea processing is enzymic oxidation of catechin into theaflavin and thearubigin to some extent. Catechin in semi-fermented tea is partially oxidized but less than black tea, as against no enzymic oxidation in green tea processing. This special technique creates the specific taste of semi-fermented tea which is different from either green tea or black tea. That may be one reason why it is now attracting more and more consumers who neither like the stringency of non-fermented tea nor the fermented flavor of black tea. This quality fermented tea is now produced in only a few regions of China where adequate climatic condition can be met. This constraint limits the supply of quality semi-fermented tea. When comparing Sri Lanka with these regions where semi-fermented tea is produced in China, it is found there are some similar production conditions and it suggests possibility for Sri Lanka's tea industry to fill the gap of demand for this group of tea in China.

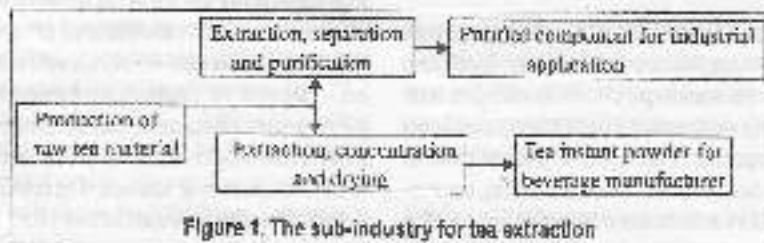


Figure 1. The sub-industry for tea extraction

China's soft drink market, Ready-to-drink tea is one of three major soft beverages, based on the selling value. Water ranks the first, followed by carbonate soda drink. The market of ready-to-drink tea is only handled by very few companies such as Kangshifu, Tongyi and Wahaha etc.

Ready-to-drink tea emerged at the mid-1980s in China. At that time, very few people recognized its potential and it stagnated during the first ten years. In the recent ten years, it is booming and is deemed to be one impetus of upgrading Chinese traditional tea industry. Statistics show that about more than 4,000,000 metric tons of this soft drink were sold in 2004. It utilized approximately 20,000 metric tons of tea material and created value addition around

when moving under strange climatic conditions. This explains the reason for failure occurs in the introduction of clones from China to Sri Lanka for purpose of developing green tea. As a result, despite much uncultivated area, Sri Lanka was able to export only a limited amount of green in recent years, as shown in the Table 6.

Now, there is new situation emerging in Chinese domestic market, as discussed in the preceding section, and that will probably provide some potential opportunities for Sri Lanka's tea industry. The following are a couple of such opportunities.

Potential Market of Semi-Fermented Tea

The demand for some semi-fermented tea is grow-

ing. At first, some kinds of semi-fermented tea need leaves of big leaf clone which contains relatively much polyphenol content. Big leaf clone can grow well under the condition of high average temperature, so this clone is mainly cultivated in southern part of China, such as Yunnan and Guangdong Provinces. In addition to the requirement of tea plant clone, high environmental temperature is also necessary for the processing of some semi-fermented tea. Sri Lanka has some common features with the above mentioned provinces in China in aspect of climate and tea plant variety.

Secondly, quality tea is usually related to the elevation of tea field, which is relevant to the spectrum of sunlight. Generally, tea from this field in high height can correspondingly get high quality and earns attractive price for its unanimous recognition from consumers. But extensive cultivation in high elevation in China will encounter geographical constraints. China is located in the temperate zone, so temperature in high elevation regions normally drops to below Celsius zero in most time of the winter.

Table 5 Composition of tea categories for export in China, 2004

Year	Green tea	Black tea	Oolong tea	Herbal tea
Volume (metric ton)	1927	394	156	214
Value (US dollars million)	294.0	41.8	44.9	55.1

Source: Customs Bureau, China

Table 6 Export of Green Tea, Sri Lanka

	2001		2002		2003		2004	
	Volume (1000 kg)	Value (Rs. Mn.)	Volume (1000 kg)	Value (Rs. Mn.)	Volume (1000 kg)	Value (Rs. Mn.)	Volume (1000 kg)	Value (Rs. Mn.)
Green tea	27	145	222	164	345	257	154	475

Source: Sri Lanka Customs

Unduly Low temperature may cause physiologically adverse impact on tea plant and even freezes it. That is why tea field is usually distributed in low height area in China. In contrast, tea field in Sri Lanka is largely located more than five hundred meters high in elevation. It has been recognized that the black tea in Up country, such as Nuwara Eliya area, contains richer aromas than that in low country. These aromas can meet the requirement of high quality semi-fermented tea. Besides that, big temperature difference between day and night is a desirable condition for the processing of some semi-fermented tea kinds and this condition can also be ensured in Sri Lanka.

Booming Demand of Raw Material for Tea Extraction

As mentioned at the beginning part of this paper, about total 50,000 metric tons of raw made

tea is consumed in China for the purpose of tea extraction annually, including ready-to-drink tea and component purification. This raw material covers different groups of tea, including green tea, black tea and Oolong tea. With respect to ready-to-drink tea market, black tea and Oolong tea is more prosperous than green tea because liquor of green tea is not easy to preserve in original color and taste. Now, the processing industry in China is in shortage of raw material supply, especially in black tea. In China, Guangdong and Yunna Provinces which were once major black tea-producing regions are now shifting from black tea to other tea due to high price. The other regions cannot meet the supply of raw black tea because of low content of polyphenol. In addition, Sri Lanka's black tea contains more polyphenol than China's one and it suggests more advantages for Sri Lanka's black tea to be used for extraction.

In order to capture share in this segment of the tea

market in China, Sri Lanka's industry can act in two steps. First is to promote the export of relatively low grade of broken black tea. High grade of black tea should enjoy appropriately high price and therefore is not competitive in this regard. Contrarily, low grade of black tea is sufficient to satisfy the purpose of extraction. Sri Lanka may reach this objective by establishing an agent to distribute to different extraction manufacturers in China. Then, since the cost of the production in Sri Lanka is still high mainly due to high labor cost, it needs to find ways to cut down the labor cost. Therefore, it is necessary to adopt labor cost-saving technology in tea production and processing, such as application of machine-plucking technology. This kind of tea has no specific requirement for shape and color etc, so it is feasible for the application of mechanical technology. Sri Lanka can enhance its competitiveness in marketing in China by reducing labor cost of tea processing.

Contd. from Page 27

introducing an integrated approach where the provision of information and services could help people to overcome poverty.

Chapter 8 by Sunil Chandrasiri is the only paper in the book which uses an econometric model. Here, a simultaneous equation model is used to find the intra-link between technology and productivity in Sri Lanka. The model overcomes the shortcomings of the previous studies on the subject matter and uses the Structure-Conduct-Performance framework used in Industrial Organization theory. The findings do not show technology as a determinant of productivity (measured in relative terms), but industrial concentration is found to be an important determinant of productivity and this result clearly does not support the traditional Schumpeterian argument.

In Chapter 9 Mahendra Amarasuriya shows the inadequacy of the Porter's (1990) Competitive Diamond framework in determining the competitive advantage of a nation in the modern day world where Knowledge-Management techniques in firms have progressed to unprecedented levels. Competitive strength today depends on speed, agility, managing knowledge-flow and all large global companies have formal knowledge-management programmes. In Sri Lanka, only one or two corporates have such programmes and many companies are not 'Knowledge-Ready' to face competition in a

knowledge-based global market. While highlighting the need for firm levels innovation, he points out that the government has to play a facilitating role for the private sector to exploit knowledge-based techniques for the advantage of Sri Lanka.

The final Chapter (10) by Anura Ekanayake is on Competition, Industry and Consumer. Ekanayake shows the advantages of trade liberalization, however, he cautions that if trade liberalization is not accompanied by corresponding liberalization of factor markets (land, labour, and capital), development of infrastructure and promoting a competitive environment, the survival of domestic industries will be under threat and lead to job losses. Such a scenario can strengthen lobbies to reverse the trade liberalization process, thus it is important to sequence the trade liberalization to bring minimum disadvantage to domestic industry and maximum benefit to the consumer.

What has been elaborated above is an overview of the Chapters. The Chapters themselves have not been subjected to a critical analysis and this task is left to another subsequent reviewer. Moreover, the contents of the discussants have not been examined by the reviewer.

Based on the initial reading it is noted that the book lacks an overall introduction, however, the abstracts of each Chapter somewhat makes up for it. After the Human Resources Development Review 1992/93 (Human Resources Development Council, 1994) and the National Human Develop-

ment Report: Sri Lanka (UNDP, 1998) there has not been a comprehensive report on Human Development in Sri Lanka. In addition to giving an up-to-date account on Human Development, the report brings in the new Knowledge-based dimension and in that sense it is an important contribution and fills in an existing void in the existing local literature on the subject. Most of the Chapters are backed by good research efforts and a number of references on the subject which may prove useful for a broad spectrum of scholars. The authors and editor must be applauded for their effort.

All in all, it is a timely publication when Sri Lanka is lagging behind in knowledge-based techniques compared to many of her competitors. The book gives a clear message, i.e., Sri Lanka can no longer sit on her laurels of achieving high HDIs to face the future challenges of the global economy. There is a long way to go for Sri Lanka to be Knowledge-Ready and the policy apparatus should be well geared to face the challenge. If not, it would be another case of "missed opportunities" for Sri Lanka. The contents of the volume could be of great interest and value for policy makers and administrators as well as students, teachers and researchers in economics.

(The review is based on the Introduction to the Book made at the launch of the publication organized by the Sri Lanka Economic Association, OPA Auditorium, 25 January 2005)

Oil Price Surge and Quest for Energy: Sri Lanka in Global Perspective

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During the last two months, world oil prices have remained stubbornly high around an average value of US \$ 55 per barrel. The oil prices have been on the upward trend since the beginning of 2005 (see Table 1). A Singapore based commentator stated that, 'As long as oil demand remains strong, in the short-term we cannot expect prices to drop significantly'. The world oil market has entered into a new phase where there is significant increase in the global energy demand which can be met by a few countries with a functional ability to increase supply. Current changes in the world oil industry and market are bound to have deep impact and implication for both oil producers and oil consumers.

Increasing Demand

The last few years have seen an unusually sustained strong demand. Table 2 shows that the global demand for oil has risen from 76.7 million barrels per day in 2000 to 84.3 million barrels per day in 2005. And this high rate of demand growth, although it might slow down as indicated in the Table (from 2 per cent in 2005 to 0.7 per cent in 2025), is unlikely to reverse its course in the near future. Demand for oil is on the increase due to the rapid growth in Asian countries, in particular India and China. With the rapid growth of these two economies, the number of middle class vehicle owners has increased rapidly contributing to the additional demand. 35-40 per cent of additional oil demand during the last 5 years has come from China and India. But US still remains the largest oil consumer in the world accounting for 25 per cent of global consumption. India is the 6th largest energy consumer in the world and by 2010 it will be the fourth largest. Asia will account for one-third of world oil demand by 2025.

Table 1: US \$ Price of Crude Oil per Barrel - January-August 2005

Month	January	February	March	April	May	June	July	August
Price	50	52	55	49	52	53	67	68

Note: Hatched-off Price
Source: <http://business.updates.com>

Supply Bottlenecks

There are indicators of slow growing OPEC supply capacity and shrinking of the world refining capacity. Table 2 shows the supply of oil from OPEC and Non-OPEC countries and the energy demand scenario for the 2005-2025 period. OPEC stock changes will be slow and until about 2015 it will provide 37 per cent of the world supply. Non-OPEC supply is forecasted by many oil economists to continue growing at about 1 million barrels per day for the next few years and will not be adequate to cover the total global demand. Traditional OECD countries have peaked their oil production capacity. For example, US has not built a new oil refinery for the past 29 years and the US is running its old refineries at above 90 per cent of the capacity.

The whole oil industry chain of supply from crude oil production to shipping and refining has become very tight. Why could not the oil suppliers anticipate the current demand? Let us examine the contemporary situation.

The first is that the world had taken it for granted that OPEC would always have enough spare capacity. The non-OPEC countries did little to explore alternative sources of energy during the last decade. In fact, growth in oil production in non-OPEC countries is going to show a decline from 2015. Oil is the only industry in which the best and capital assets are not in the hands of the most efficient and best capitalized firms (see Table 3). Two-thirds of the oil reserves are found in the Persian Gulf, where foreign firms are mostly unwelcome.

Second, is the low oil mentality of both oil producing countries and energy industrialists. Both were sceptical about the sustainability of a high oil price of over US \$ 20 per barrel in the past. Thus upstream, and downstream investment plans were based on very low crude oil price of between US \$ 20 and 25 per barrel. Consequently, for downstream investment, business environment was not encouraging enough for energy companies to consider any new investments.

Third, is the upstream policy which was misplaced after the price increase of November 1998 OPEC meeting in Indonesia. OPEC since then has been trying to prevent any big inventory increase in the world and has been coordinating very carefully with member countries the necessary level of her production (current official ceiling - 27.5 million barrels per day).

Speculation

There is price volatility in the oil market with prices fluctuating between US \$ 45-55 during April-May 2005. Speculative activities in the oil market have increased by the past erratic behaviour of prices and the key factors contributing to these speculations are: (a) the uncertainty of oil policy under the new President in Iran, (b) the uncertainty in the OPEC after the death of the King of Saudi Arabia in July 2005; (c) the uncertainty over the recovery of some oil wells in Iraq after the US bombing in March 2003; (d) Hurricane Katrina in USA disrupting

Table 2: Demand & Supply of Oil 2005-2025

MILION BARRELS/DAY	Historical		Projection			
	2000	2005	2010	2015	2020	2025
WORLD OIL DEMAND % Growth per annum	71.7 2.0%	84.3 2.0%	92.5 1.9%	98.1 1.4%	101.3 1.1%	102.8 0.7%
NON-OPEC SUPPLY (INC. NON-OILERS)	49.7	61.9	60.5	62.2	62.9	63.7
GAFF ON OPEC CRUDE OIL Stocks change	21.0	21.5	32.5	37.0	41.5	44.2
OPEC CAPACITY (INCL. NON-OPEC CAPACITY) / RATIO SHARE OF OPEC SUPPLY (Constant only)	31.1 43.4	37.0 43.9	35.4 38.3	38.9 39.6	44.5 43.9	48.7 47.4

Source: OPEC

oil refineries in the Gulf of Mexico in late August 2005; and (e) whether there will be adequate supply of gasoline when winter arrives in the Northern hemisphere. The floor price of at least US \$ 40 - 45 per barrel compared to US \$ 20-25 per barrel is the likely scenario soon.

Emerging Trend

There are now signs of OPEC's supply responding to global demand. OPEC has revised its earlier stance and is attempting to increase inventories before an expected fourth-quarter peak in consumption. The organization is currently having discussions on raising output by an additional 500,000 barrels a day. The extra oil will mainly come from Saudi Arabia and Kuwait. The OPEC is quite confident that the speculative bubble will burst with such increase in production, but some others feel that it is not the increase in supply of crude oil that matters but the availability of refineries to produce the type of oil that is in demand by the global consumers. A prominent energy investor banker thinks that in view of rising input costs (for such things as oil rigs, steel pipes, tankers, and so on) the oil prices need to go further up (The Economist, April 30, 2005). But others say that working out a fair price for oil is "a moving target; it needs to be comfortable for both consumers and producers, and at a level where investors will put money in to the growth of the industry".

The international oil prices shot above US\$ 70 per barrel in the last week of August 2005 amid concerns about the damage to oil production facilities in the Gulf of Mexico caused by Hurricane Katrina. Petroleum importing countries around the world, both developing and developed are facing the challenge of handling the unexpected and unprecedented increase in oil prices. Economists fear that such levels could severely dent consumer demand and curb business activities. Some are referring to this situation as the "third oil shock" after the first in 1973 and the second in 1979/1980. Asian leaders have been scaling back growth estimates for 2005 since August when crude oil started to climb above US \$ 60 per barrel. Many countries around the world are taking steps to curb the demand for oil and looking to alternative sources of energy. It is vital to ask at this jun-

Table 3: Oil's Rich List - Top 20 Oil Companies, by Reserves, 2003

Company	Country	State Ownership %	Million Barrels
Saudi Aramco	Saudi Arabia	100	259,400
NIOC	Iran	100	125,800
INOC	Iraq	100	115,000
KPC	Kuwait	100	99,000
PDV	Venezuela	100	77,800
Adnoc	UAE	100	55,200
Libya NOC	Libya	100	22,700
NNPC	Nigeria	100	21,200
Permex	Mexico	100	16,600
Lukoil	Russia	8	16,000
Gazprom	Russia	73	13,600
Exxon Mobil	US	-	12,900
Yukos*	Russia	-	11,800
Petrochina	China	90	11,000
Qatar Petroleum	Qatar	100	11,000
Sonatrach	Algeria	100	10,500
BP	Britain	-	10,100
Petrobras	Brazil	32	9,800
Chevron Texaco†	US	-	8,600
Total	France	-	7,300

* Now in effect controlled by government

† Does not include newly acquired Unocal

Source: *Petroleum Intelligence Weekly*

ture what is Sri Lanka doing to cope with the situation?

Oil Pricing in Sri Lanka and Coping with the Oil Price Surge

When Sri Lanka signed the stand-by package with the IMF in March 2001, one of the conditions that the country had to fulfill was to introduce an automatic pricing for petroleum. In other words, petroleum prices should not be subsidized and should be adjusted according to the fluctuations in world market prices and passed-through to the consumers. Although this was a commitment undertaken by the government of Sri Lanka, this policy was not implemented in 2001 due to the political crisis that year. It was the newly elected government in late 2001 that implemented this policy in January 2002 and rescued the IMF package that was falling apart in 2001. Although automatic pricing for petroleum was put into operation, both diesel and kerosene were sold at the subsidized prices taking into consideration that kerosene is used more by the non-affluent and that an increase in the price of diesel can substantially increase public transport cost and thereby burden the less affluent masses.

The automatic pricing policy for petroleum was abandoned in January 2004 to cushion the cost of living before the April 2004 general elections. The incoming new government continued with the policy it inherited due to fears of passing a higher price of oil on to consumers. Thus since 2004, petrol is sold below the automatic pricing formula and it continues today as a government policy. At present, petrol (general) is sold at Rs. 80 per litre

compared to the market price of Rs. 90 per litre. Diesel is sold at Rs. 50 per litre compared to the market price of Rs. 65 while Kerosene is sold at Rs. 30 per litre compared to the market price of Rs. 70 (figures as at 01 September 2005). The Ceylon Petroleum Corporation (CPC) is selling these oils below the market price with a subsidy from the Treasury which amounted to Rs. 14.5 billion in 2004 and for the first half of 2005, the subsidy has amounted to Rs. 9.2 billion due to the escalating prices of oil in the world market. It is expected that the oil subsidy for 2005 will exceed Rs. 20 billion – a very large sum indeed.

The Lanka Indian Oil Corporation (LIOC) which bought 33 per cent of the CPC in 2002 was also requested to follow the subsidized pricing policy for oil from January 2004. Consequent to LIOC selling of oil below the market price it had to forego US \$ 60 million due to the company. The LIOC is making a claim for this sum from the Treasury; however, the Treasury is of the view that the government is not liable to pay the US \$ 60 million unless LIOC makes actual losses due to government determined pricing. This dispute remains far from settled at this juncture.

In this uneasy situation, the government is making attempts to minimize the hardship to the consumer by taking various measures. The 15 per cent VAT applicable on diesel was removed a month ago with the objective of giving some relief to the consumer. However, the National Chamber of Commerce of Sri Lanka has stated that there has not been any reduction of diesel prices in the market. What appears to have happened is that both the CPC and LIOC may have been allowed to collect this sum from the VAT to maintain the subsidized pricing of diesel instead of the Treasury making a transfer to these companies for the diesel subsidy.

One can recall the President and the late Foreign Minister making a visit to Iran in November 2004 to negotiate a deferred payment for oil imports from Iran. Given Sri Lanka's foreign exchange situation, Iran which accounts for 36 per cent of oil imports to Sri Lanka granted a US \$ 180 million deferred payment. A few months ago, India, which accounts for 23 per cent of Sri Lanka's oil imports, granted a US \$ 150 million line of credit on an instalment pay-

ment basis for purchase of oil. Both these schemes have now been fully utilized. It is reported that the government is contemplating on securing another line of credit from India for oil purchases. It is also reported that a high government official is scheduled to meet the G-7 group to make a request to extend the debt moratorium that was granted to Sri Lanka in the aftermath of the Tsunami. The extension for the US \$ 300- 500 million debt payments for one year more (2006) is based on Sri Lanka's inadequate foreign reserves to meet such debt obligations after paying heavy oil bills. These efforts clearly indicate the reluctance on the part of the political establishment to pass on the higher oil prices to the consumers and continue with the universal subsidized pricing policy.

The use of subsidies for the oil sector is not unique to Sri Lanka. Many countries provide subsidies for the oil sector to cushion the producers and consumers from fluctuations of the global oil prices. However, when oil prices are reaching unprecedented levels, governments seriously consider cutting down the subsidy at least for petrol and find various ways and means to conserve energy (combat demand) and find alternate sources of energy (increase supply).

Strategy to Face the Situation and Quest for New Energy

Investment must be made now to bring new energy resources within the next decade and about US \$ 16 trillion investment is required to meet energy needs by 2030. The message is that both supply enhancing and demand management policies vis-à-vis energy are considered as necessary to meet the current challenge by many countries. The new situation is causing the US, Europe and Asia, in particular, Singapore, China, India, and Japan to re-evaluate and to reconsider their energy policies according to their own strategic goals and objectives. Many countries are exploring alternative sources of energy and methods to curb demand for same. More energy diversification would help to ease demand for oil and other fuels and would make these countries less vulnerable to price hikes or sudden shortages of oil. Developed countries are looking for nuclear power as an alternative though it is costlier. Wind power is another cheap and clean source of energy. General Electrics claim that "one General Electric wind turbine can produce enough electricity for about 400 houses each year".

The Communist Party in China has urged citizens to conserve electricity by turning air-conditioners in government buildings to no lower than 26 degrees Celsius and wear thinner clothing rather than Western suits. Meanwhile, China is going all out to ensure energy security to sustain its rapid economic growth. With rise in oil nationalism particularly after 9/11, big consumers such as China are locking in "equity oil" to have peace in mind (The Economist, 30 April-6 May 2005). Two months ago, China's National Off-Shore Oil Corporation (CNOOC) offered the highest bid (above that of Chevron) to purchase the US oil company Unocal in order to gain assets, particularly gas, in Southeast Asia which is the hub of CNOOC's overseas activities. The Chinese government has taken a deliberate decision to secure Chinese oil and gas assets overseas in order to address its long term concerns relating to security of energy supply. This purchase attempt has sent alarm bells throughout the USA.

Other countries/regions too have taken various measures to face the current energy crisis. For instance, in Thailand, Prime Minister, Thaksin Sinawatra has already announced strategies to restrict usage of energy and he stated "A compulsory requirement may be needed if people fail to cooperate with the government's current campaign". In Western Europe tax incentives are offered to people to switch to diesel based motor vehicles and 42 per cent of new car buyers go for diesel vehicles. In Indonesia, President, Susilo Bambang is contemplating on scrapping the fuel subsidy amounting to US \$ 6.4 billion despite mass protests. The Malaysian government has raised petrol and diesel prices four times since last October in a bid to cut the soaring cost of fuel subsidies.

These measures are taken to conserve foreign exchange, particularly by targeting the more affluent people who use the highest amount of petrol and who are the major beneficiaries of the petroleum subsidy. It is the general view that the non-affluent should not pay for a subsidy that is mostly used by the affluent.

Sri Lanka does not seem have a long term strategy to deal with the oil price hike. Time and again, respective governments have been advised to take measures to cut down the use of oil. The government was advised on the need to improve public transport (both the bus and railway services) to reduce motor vehicles on the road and thereby reduce traffic congestions. In fact, the 2004 Annual Report of the Central Bank (CBSLAR) stated: "Developing an efficient mass transport

system will not only reduce the use of private vehicles thereby saving energy, but will also help to protect the environment" (p.15). It is reported that currently there are 2.2 million vehicles on the roads and road congestions lead to large wastage of fuel and the country loses Rs. 20 billion annually in traffic congestions (Commissioner of Motor Traffic).

Successive governments were also advised to move fast on coal power projects and the remaining hydro power projects to reduce the 65 per cent dependence on thermal power for electricity supply. Sri Lanka's hydro energy sources are reaching saturation level (only three new large projects remain). Thus, biomass, wind power, dendro, etc., should be fully explored to produce new energy from non-oil sources while accelerating coal power plants (Norachchalai and other new sites). It is reported that a Chinese company was given the contract for Norachchalai and work will begin in October 2005. This is good news but what steps has Sri Lanka taken to restrict demand for energy? Will there be restrictions on electric power use? A 10 per cent reduction in oil consumption would have saved US \$ 150 million a year (CBSLAR, 2004, p. 15).

In a recent interview, the Finance Minister has stated that "...we should take every step to restrict the use of fuel. Fuel is being used in a wasteful and in an anti-social manner. I am going to set up a ceiling on the funds, which the country will have to spend on fuel. Once we set up the ceiling, we will have to impose restrictions up to that ceiling. There is no other option" (Daily Mirror, 29 August). He went on to say that transport will not be restricted but the affluent will have to pay the market price of petrol very soon.

It is good to note that the government will take some steps to curb fuel demand but this would not be adequate and a lot more needs to be done on both to control demand for oil and increase supply of less oil dependent energy. The problem is that it is election time in Sri Lanka and whatever citizens resist and is unpopular will be avoided and postponed. This means that in the medium to longer term there will be more burdens on the economy.

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