SECOND BIENNIAL CONFERENCE ON SCIENCE & TECHNOLOGY (BICOST-II)

S&T IN INFRASTRUCTURE DEVELOPMENT

CONCLUSIONS & RECOMMENDATIONS

(PRELIMINARY REPORT)

[

[This report was developed into an action plan comprising of an implementation strategy/proposed action at the Post-BICOST Workshop held in February 2003]

(A) FOOD AND AGRICULTURE

These recommendations cover the AGRICULTURE, FORESTRY AND FISHERIES SECTOR, which includes:

- Plantation Agriculture - Tea, Rubber, Coconut
- Domestic Agriculture - Paddy, Subsidiary Food Crops (SFC), Vegetables, Fruits, Minor Export Crops (MEC), Floriculture & Animal Husbandry

The FUNCTIONALS of infrastructure are:

Communication
Waste Management
Transport
Water Management
Energy (Alternative)

The Working Group felt that, for completeness, other areas for consideration were:

Land
Legislation
Financial Services

The above, however do not fall within the scope of the BICOST-II theme and mandate.

The recommendations that follow fall within a comprehensive agriculture policy that covers the following:

INPUTS

PRODUCTION

POST HARVEST HANDLING & PROCESSING

MANUFACTURING

MARKETING
(Storage, Transport, Communications)

The recommendations are aimed at achieving the broad policy objective of promoting food security and external trade, by focusing on areas where Sri Lanka has a comparative or competitive advantage.

a. Communication

Issue 1:
Dissemination of technical and market information
Recommendation:
Establishment of telecenters in farming communities for dissemination of relevant information

Issue 2:
Utilisation of technology for higher productivity
Recommendation:
Adaptation of existing remote sensing technologies for fishing and agriculture

b. Waste management

Issue 1:
Minimisation of water pollution
Recommendations:
Monitoring of pollutants and R&D in phyto remediation for pollutants to address cleaning of polluted water bodies
R&D on effluent treatment from agro processing plants

Issue 2:
Minimisation of hazardous chemical usage
Recommendation:
R&D on integrated pest and disease management to reduce the use of hazardous chemicals

Issue 3:
Production and post harvest handling and processing
Recommendation:
Development of protocols for Hazard Analysis and Critical Control Point (HACCP) management

c. Transport

Issue 1:
Minimisation of post harvest losses during packaging and transporting
Recommendation:
Development of protocols for packaging and transporting respective categories of agricultural produce

Issue 2:
Reduction of product price through minimising transport costs
Recommendation:
R&D using Location theory and transport planning approaches to determine the locations, if necessary, for regional wholesale markets, so that transport costs are minimized and the benefits of such reductions could be transferred to both producers as well as consumers.

Issue 3:
Increase of efficiency and effectiveness in transportation of agricultural produce and reduction of wastage.
Recommendation:
Study of existing wholesale markets towards achieving high efficiency, waste minimization and lower turn around times for vehicles used for transport. This includes a suitable goods handling system, vehicle parking system and an internal stall layout that would optimize total operational cost of the facility.

d. Water management

Issue 1:
Maximum utilisation of water resources in hydropower reservoirs
Recommendation:
Development of an optimization model for the use of water from major hydropower/irrigation projects for agriculture and electricity generation.

Issue 2:
Optimum utilisation of scarce water resources
Recommendation:
R&D on Precision agriculture

Issue 3:
Uncontrolled reclamation of marshy land
Recommendation:
R&D on land reclamation

Issue /Recommendation 4:
R & D for drought/salinity resistant varieties

e. Energy

Issue /Recommendation 1:
Development and adaptation of low cost solar dryers for dehydration for agricultural processing.

Issue /Recommendation 2:
Study to identify locations with potential for high agricultural output and the required alternative energy sources that can be adopted at those locations to enhance value addition in agriculture.

Issue /Recommendation 3:
R & D for agro forestry to support dendro power

Issue /Recommendation 4:
R & D for conservation of energy in land preparation, harvesting & handling

(B) ENVIRONMENT

a. Land

Issue 1:
Soil pollution / Salinisation
Recommendations:
Bioremediation (adaptation of technology)
Detoxification
Minimizing dispersion (Better waste management)

Issue 2:
Coastal erosion
Recommendations:
Mapping to identify areas that might be affected by sea level rise
Alternatives to corals/sand in the construction industry

Issue 3:
Combat desertification
Recommendations:
Mapping using satellite technology
Studies on species for restoration
S&T for Impounding rain water/recharge aquifers

b. Water

Issue 1:
Ground water
Recommendations:
Mapping /Publication

Issue 2:
Ambient Water Quality
Recommendations:
Technology for desalinization, including sea water
Domestic Water purification kits

Issue 3:
Water quality monitoring; modelling and predicting pollution trends
Recommendation:
Develop technology and capacity

Issue 4:
Maintenance and upkeep of rivers and tanks & restoration of urban lakes
Recommendation:
Develop technology and capacity

c. Air

Issue 1:
Degradation of air quality in urban / industrial areas
Recommendations:
Monitoring/trend analysis with reliable data

Develop stack emission standards
Emission control for small/medium industries (strengthen existing capacity)
Low cost emission monitoring equipment

Issue 2:
Indoor air quality
Recommendations:
Low emission stoves
Capacity for monitoring air changes

Issue 3:
Factory air quality
Recommendations:
Develop standards

Issue 4:
Regional air quality
Recommendations:
Capacity to monitor, collate, analyse and predict trends

d. Biodiversity

Issue 1:
Resource mapping and baseline data
Recommendations:
Mapping – Identify priority areas

Issue 2:
Over-exploitation / sustainable use
Recommendations:
Establish sustainable levels of exploitation
Captive breeding/cultivation and Enrichment
Value addition for sustainable use

Issue 3:
Environmental pollution
Recommendations:
Enhance environmental valuation capacity

Issue 4:
Habitat degradation
Recommendations:
Identification of critical habitats/indicator species

Issue 5:
Taxonomic studies
Recommendations:
Enhance scientific methods

Issue 6:
Invasive alien species
Recommendations:
Management/Control

e. Alternative energy

Issue 1:
Increase the share of alternative energy
Recommendations:
Increase S&T to adapt/develop technologies on dendro power, mini-hydro, solar power & Biogas
Propagation and Agronomy of species suitable for dendro power
Reducing emissions/effluents from dendro power units
Source-Site matching for alternative energy use in non-grid areas

f. Transport

Issue 1:
Vehicle emissions
Recommendations:
Emission inventory
Road network planning

g. Waste management

Issue 1:
Solid waste
Recommendations:
Low-cost sanitary landfills
Low cost waste carriers
Research on biodegradable plastics
Further developments in large scale composting
Incineration of waste and generation of electricity therefrom

Issue 2:
Liquid waste
Recommendations:
Establish realistic standards for waste water (discharge on land)
Cost-effective, more efficient treatment methods
Waste water recycling technology
Clean technology for low volume water (bench marking)

Issue 3:
Hazardous waste
Recommendations:
Waste oil recycling (development and adaptation of technology)
Capacity to assess technology
R&D for Using less-hazardous chemicals in industry
Biofertilizer standards – Heavy metals in soils
S&T inputs to Update/revise hazardous waste management regulations

Issue 4:
Noise / vibration
S&T inputs for cost-effective mitigatory measures

General Issues:
S&T support for important elements in ISO 14001 accreditation; S&T for eco-labelling; Eco-design
Recommendations:
Accreditation for testing labs

(C) HEALTH

a. Water

Good water ⟶ Better health

Issue 1:
Prevention of Water Pollution (Industrial/Agricultural/Natural Pollutants)
Recommendations:
Geographical Information System (GIS) use for identification/assessment of areas of polluted water sources
Development of Ambient water standards
Continuous monitoring of water quality for disease prevention (special reference to particular geo-areas)
Methods for purifying effluents of small industries
Development of a simple test kit for monitoring quality for basic contaminants.

- Public health laboratories
- General public

Institutions: Universities could be the Regional Centres for testing (for sophisticated / expensive tests)

Issue 2:
Water Management - Provision of adequate quantities of water in water depleted areas (through better water management practices)
Recommendations:
Rain water harvesting
Recycling
Research on effects of tubewells, on ground water levels.

b. Energy

Issue 1:
Provision of uninterrupted supply of electricity (especially in rural hospitals)
Recommendations:
Alternative supplies of Energy and Energy saving methods
Solar panels (lighting & refrigerators)
Biogas (for recycling of non-hazardous waste in hospitals)
Alternative methods for continuous supply of electricity for rural sector from National Grid

Issue 2:
Impact of Energy on health - Health hazards from products formed during energy generation & utilisation (respiratory diseases due to smoke etc.)
Recommendations:
Improved technologies (low cost) for traditional methods of cooking (smoke chimneys, low smoke cookers)
Recycling energy - Harnessing of heat produced during hospital incineration, for other purposes such as heating
Energy saving methods (New hospital designs for energy saving/use of natural light; Develop a mechanism for automatic switching off of electricity supply (eg light Sensors); Rural homestead lighting – prevention of home accidents)

c. Transport

Issue 1:
Accidents
Recommendations:
(for prevention of road traffic accidents)
Road design and state of the road (cheaper methods of maintenance and decrease of traffic load)
Rigorous regular testing of drivers
Mandatory testing of road worthiness of vehicles (MOT)
Research on behavior of road users
Detection equipment for rigorous traffic offences E.g. Cameras in strategic sites
Improvement of street lights for night driving
Rail crossings – better signaling/remote automatic gates
Luminous lighting of pedestrian crossings
Prohibiting the use of cell phones
Well equipped ambulances with trained paramedics
Designing of cheaper mobile clinics in remote areas without motarable roads
Expand rural road network-faster access to hospitals

Issue 2:
Vehicles and pollution
Recommendations:
Test exhaust emissions
Emission standards
Establish testing laboratories/upgrade existing ones.
Maintenance/calibration of testing equipment
Assess the quality of imported reconditioned vehicles.
Face Masks. (mass production of cheaper masks)
Testing of ambient air quality
Baseline data on the present status of Pb of and other pollutants in blood and monitoring system
Research on noise pollution
Improvements to railway systems and Dutch canals for rapid transportation with reduced pollution
Development of modes of transport for disabled people (Eg. Mechanised wheel chairs)
Design roads to increase safety and reduce traffic load
Electrification of public transport in cities
Design of rural multipurpose vehicles
Cheaper packaging for transport of medical supplies : Samples for testing
Bus side mirrors with flexible arms for prevention of accidents

d. Communication

Issue 1:
Health Information System (Accuracy and timeliness of data)
Recommendations:
A strategic patient information systems with network facility (within and between institutions)
Design of computer friendly data forms for health personnel at periphery
Development of web sites for Health Department – LAN for all health care Institutions (Information of consultants, drugs, side effects of drugs, hospitals) – for patients to receive information
Closed circuit TV in hospitals (telemedicine) for health education.
Interactive computer terminals in hospitals for patients/visitors, information retrieval

Radio Channels dedicated for regular health educational programmes
Research on Health problems associated with high tension lines and communication towers
Emergency alert systems for house bound patients/first aid
Development of communication systems for obtaining information on emergency medical treatments

Other Issues:
To reduce radiation from cellular phones - Designing of special cases
Telecom towers/high tension power lines
Research on impact from radiation through TV and Computer screens

e. Waste management

Issue 1:
No proper waste disposal system
Recommendations:
Separation of Hazardous waste
Disposal of Hazardous Clinical Waste
Development of simple technology for small hospital for disposal of waste. (rural sector) – eg. Pressure cookers

- plastics (syringes etc)
- infected material
- needles (sharps)
- glass recycle

Incineration in the peripheral health centres – technology to be developed (for more than 1200 ^{0}C)
Designing appropriate incinerators and autoclaves

Issue 2:
Disposal of Radioactive Waste
Recommendations:
Effective monitoring of Radioactivity and maintenance of standards
Calibration of x-ray equipment/maintenance

Issue 3:
Health implications of waste
Recommendations:
Hospital sewerage systems – new developments
Low cost technology for recycling of waste
Design and operation of residual waste disposal – non bio degradable waste
Cleaner production systems to be encouraged in health sector
ISO 14000 status to be encouraged

f. Quality assurance in health care

Ayurvedic

Issues:
State to recognise standardization of Ayurvedic products
Regulation of dispensing Ayurveda drugs
Quality assurance of Ayurvedic drugs
Protocols for Ayurveda Clinical trials

Allopathic

Issues:
A more rigorous system in assessing quality control of important drugs
Laboratory accreditation for reliability of lab results (ISO standards to be established)
State / private sector
WHO documents on "laboratory policy" available - implement
Develop indicators for Quality Assurance of medical care – dental and medical
Development of treatment protocols (evidence-based medicine)
Implementation of R&D Quality Management Report
Servicing and the calibration of equipment
Hospital management – clinical audits, administration procedures, surgical theaters
Biomedical engineering – develop systems for maintenance at Central / Provincial level

Other Issues:
1. National Health Technology Policy
    - Importation of high tech equipment
    - Optimum use of high tech equipment
    - Utilisation after normal working hours of hospital facilities for the private sector
    - Public – Private sector participation in the use of high tech equipment

2. Outsourcing of services
    - Laundry/janitorial
    - Diet
    - Laboratory etc.
3. "Design of Hospitals" – (construction)
   suitable for different needs

(D) TRADE & INDUSTRY

General Points

- HRD (Human Resource Development) is very important in the development of infrastructure for Trade and Industry- this should be addressed in a separate workshop and will not be handled here.
- Collaboration and Cooperation among relevant Ministries is a prerequisite for the efficient implementation of S&T (Science and Technology) needed for Infrastructure Development.
- A single list of thrust areas in trade and industry needs to be prepared.
- The service sector should be included in future discussions of Trade and Industry.
- S&T interventions should be implemented regardless of political changes.

a. Transport

Issues:
Development of a National Transport Plan
Recommendation:
R&D is needed to develop a comprehensive and integrated National Transport Plan. A funding commitment (e.g 0.1% of all allocations) is needed. The R&D for this plan could cover:

- Identification of urban centers to be linked
- Development and integration of different modes of transport, i.e. Railway, Water, Air and Road Transport
- Development of a rapid transit system for congested urban centers like Colombo
- Zoning of industries (heavy and light industries should be in separate zones)
- Better traffic control

b. Information and Communication Technology (ICT)

Issues:
Present ICT facilities should be improved through demand driven processes.
Government to facilitate e- commerce / e-government for Trade and Industry.
Develop systems necessary for e-commerce / e-government (e.g. Trilingual application and the voice recognition systems etc.)
Encourage and facilitate institute- industry partnerships through individual collaborations.
PATENTS - Patenting procedures to be streamlined and made accessible via the web.
The members of the scientific community should be encouraged to patent their innovations.

c. Energy

Issues:
A comprehensive National Energy Policy needs to be developed.
Demand side management of power supply for improved efficiency of electric power in all industries.
Alternate Energy (AE) -provides a level playing field (AE is not an immediate solution but could be a solution to energy demands in the long term)
R&D need to be developed for a Long-term energy plan. (e.g. potential of Alternate Energy)

d. Waste management

Issues & Recommendations:
Raise awareness on social and environmental damage caused by ignoring waste management
Establish engineered landfills and hazardous waste management systems (cost sharing by the government and industry)
Encourage R&D on waste management methods available for the country
Industries to be made aware of S&T solutions for Waste Management
Promote ISO 14000

e. Water

Issues & Recommendations:
Reduce wastage of water
Recycle
Promote rain water collection and usage for industrial purposes
Locate/identify sources for uninterrupted quality water supplies for Industry/industrial zones

f. Quality assurance

Issues & Recommendations:
Establish a National Accreditation Board
Make known the availability of testing facilities in Public and Private Institutions to industry.
Encourage/ assist accreditation of testing services.