SACEP NEWS

Newsletter of the South Asia Co-operative Environment Programme

No.3: Issue:2
September 2004

The outgoing Director General of SACEP leaves us with these thoughts...

The Global Fight

Three years have passed quickly since my arrival at SACEP and Sri Lanka. My tenure at SACEP coincided with global events such as the WSSD and the building of the MDG goals that have increased the world's attention on the need to combine a great variety of components to combat poverty and environmental degradation. Every day this global battle to attain better environmental management increases in complexity as the common trends seems to be that the more we learn about our planet the more we extract from it, modify it and try to mould it to our needs. This should ideally be the reverse where we try to emulate natural processes. Therefore our challenge is to rethink how we choose to advance human development, tackle our problems and set trends and lifestyles.

This is no easy task and everyone is called upon to play their part. At SACEP too contributing to these global responsibilities has been our main preoccupation. Throughout the last three years ,as in the past, SACEP has strived to share experiences, build skills, increase knowledge, and win followers for the cause of better environmental management.

Integration, synergies and partnerships are the emerging weapons needed in this global fight for more stable, sustainable and secure futures. In South Asia a thrust towards this was made possible when SAARC and SACEP laid down the foundation for cooperation by signing a Memorandum of Understanding on the 8th of July, 2004 (see overleaf for more details). This MoU signifies the regions' acceptance of the need to cooperate, raise the political agenda for environmental issues, and integrate efforts aimed at development in South Asia. Both SAARC and SACEP existed since the early '80s and have contemplated this joining of forces but it had not materialised until now. This is a crucial linking that can be looked at as a collaborative long term management step that can assist South Asia to be better prepared to tackle its economic, social and ecological challenges.

As is the case with many natural processes, efforts to manage the environment can take more than three years and at times more than a lifetime to bear fruit. In addition mitigatory or protective measures must be put in place well ahead of time to avoid irreversible consequences or disasters. As these measures do not always come with guarantees and hard evidence it is harder to push the agenda and justify the trade offs. Therefore it is not always rewarding work with tangible benefits but these efforts must continue to press for support and action.

Given SACEP's small size but wide reaching geographic coverage and technical scope this has not been an easy task, but it is one in which SACEP contributes to as a piece of a puzzle that makes the whole. In the past three years, SACEP has increased staff capacity, and interactions with governments and partners to assist with establishing long-term eco-friendly structures. If SACEP is to become more proficient at the tasks assigned this trend must continue to grow and branch out. So for the incoming Director General, for those staying on at SACEP and her partners I wish strength and perseverance and extend my fullest support to further these objectives in any capacity.

I take this opportunity to thank the Government of Sri Lanka, Members (past and present) of the Governing Council and Consultative Committee and all other colleagues and friends for their professional and personal interactions that have made my stay at SACEP an interesting one. I wish you all well in your efforts to win this global battle for environmental posterity and human prosperity.

Mahboob Elahi

In this Issue

This issue concentrates on renewable energy use in South Asia

EDITORAL
Renewable Energy and Regional Cooperation

This issue of the newsletter explores some of the modalities needed to promote and increase the adoption of renewable energy sources. It also gives a illustrative look at the different types of renewable energy technologies and applications that are presently used and appropriate for South Asia.

South Asia region is one of the fastest growing economies in the world and a secure and sustainable energy base is required to maintain this rate of development. The International Energy Agency's (IEA) *World Energy Outlook* (2002) predicts the demand for energy in South Asia will increase by 35-40% over each of the next three decades. Countries in the region recognize the importance of increasing the renewable energy contribution in the national energy mix to achieve energy security.

The Political Declaration of the International Conference for Renewable Energies (Bonn, June 2004) highlighted that: *"Renewable energies combined with enhanced energy efficiency, can significantly contribute to sustainable development, to providing access to energy especially for the poor, to mitigating greenhouse gas emissions, reducing harmful air pollutants, thereby creating new economic opportunities, and enhancing energy security through cooperation and collaboration."* All of these potential benefits from renewable energy are of great importance for the South Asia region.

As highlighted in the IEA document *Renewable Energy...Into the Mainstream (2002): "The inherent characteristics of renewable energy technologies reduce or eliminate a number of [energy security] risks and this adds to their overall value. Renewable energy is a domestic resource and thus less subject to transportation or supply disruptions."* At the recent Renewables Asia Regional Workshop (February 2004) hosted by The Energy Resource Institute (TERI), the benefits of renewables to developing economies included reduced dependence on imported fuels that improves the balance of trade and usually the financial position of governments.

Renewable energy sources have substantial environmental benefits. Most technologies have zero carbon dioxide emissions, while biomass technologies are "carbon-neutral". The expansion of renewable energy usage is thus a key element of national and international strategies to combat global warming. Renewables also have an important role in improving air quality at the regional, national and local levels. The cultivation of biomass for energy production can have additional benefits in managing land degradation and improving water quality through reduced erosion.

Renewable energy has a pivotal role in poverty alleviation in the region. Around 500 million people in South Asia live in absolute poverty, mainly in rural areas. As the IEA (2002) highlights, in rural areas renewable energy sources can be the key aspirations for development, and can contribute to agricultural productivity, health, education, communications, entrepreneurship, and home quality. According to the World Energy Outlook -WEC (2002) about 60% of the Region's population still does not have access to electricity. In South Asia the following aspects of poverty alleviation are of particular importance:

- Energy inputs from renewable sources are often the most appropriate and cost effective to support the enhancement of agricultural productivity and additional income generating activities in rural areas. These inputs can often be provided as part of wider village electrification programmes.
- Renewable energies can play a major role in providing clean and efficient cooking technologies, which can lead to substantial life and health improvements for rural communities, particularly for women and children.

It is recognized that it is primarily the responsibility of national/provincial governments to seize the opportunities provided by renewable energy. However, there are definite areas where regional cooperation can complement and enhance national level activities. This is particularly the case in South Asia given the socio-economic similarities between countries and the existence of common barriers to renewable energy penetration.

In the context of South Asia, the *WEC Report Renewable Energy in South Asia – Status & Prospects* advocates cooperation in:

The sharing of manpower and know-how – Through exchange mechanisms including seminars, workshops, study visits, regionally-affiliated professional institutions, and private sector involvement across borders. These efforts must be backed by governments and supported by market forces.

Training programmes on renewable energy – Joint training programmes in areas of priority common interest.

The sharing of environmental information – Exchange of environmental data to improve understanding of local and sub-regional conditions, which can lead to better design of renewable systems.

The sharing of investments in plant and machinery – multi-national joint ventures towards improving investor confidence in supporting renewable technology projects.

A regional renewable energy fund – Such a fund for South Asia could be set up to pool resources from multilateral, bilateral and private donor agencies to support bankable projects and for general mobilization of investments.

These are just some examples of the range of possibilities available to improve the uptake of renewable technologies into domestic energy portfolios. By working together there can be multiplier effects that are of great benefit to the whole region.

SACEP extends its thanks to The Energy Resource Institute (TERI) for their inputs and contributions to this issue of the newsletter. We look forward to further interaction with TERI to increase renewable energy adoption in South Asia.

FEATURE ARTICLE from TERI
The Policy Challenges of Promoting Renewable Energy

The recent International Conference for Renewable Energies in Bonn concluded that *"increasing the use of renewables is largely an issue of policy"*. One of the major outputs of the Bonn Conference was the three priority policy recommendations for Renewable Energies:

- Establishing policies for renewable energy markets: This includes addressing market biases against renewables due to subsidies and the lack of accounting for external costs in conventional energy prices. Policies need to establish a level playing field in the energy market to create an environment that is conducive to long term investment and to provide planning certainty for industrial stakeholders and consumers.
- Expand financing options – The mechanisms for financing renewables projects need to be expanded and enhanced to overcome initial impediments, and to address barriers of traditional financing options.
- Develop the required capacity – In terms of work force, institutional framework and provision of available, appropriate and affordable technologies.

National Governments have the pivotal role for increasing the use of renewables. The Bonn Conference recommended the following actions at the national level:

- Develop an overall energy policy that emphasizes on renewable energy and fulfils sustainability objectives.
- Formulate clear goals and targets for renewables.
- Establish a transparent market that encourages investment through levelling the playing field by removing biases against renewables, and providing temporary and gradually declining subsidies to tackle high costs of Renewable Energy Technologies (RETs).
- Increase public awareness of the potentials, costs and benefits of renewables.
- Develop human capacity to develop RETs.
- Develop enabling public institutions in the areas of policy, planning, technical excellence and research.

These recommendations are by necessity very broad. A paper by Shashi Shekhar, Amit Kumar and Chintha Shah[1], looked at some of the specific policy requirements for further promotion of renewable energy in India. The particular case of India provides valuable learning opportunities for other South Asian countries as they advance in the adoption of renewable energy technologies (RETs).

The current Indian policy environment has been successful in creating one of the largest and most diverse renewable energy programmes in the world, with a broad technological base and large human capacity. This programme has been driven by the establishment of the Ministry of Non-conventional Energy Sources. The new Electricity Act 2003 has provisions to encourage increased use of RE power. The act mandates the State Regulatory Commissions (SERC) to determine quotas of electricity cogeneration and RETs and to also promote their use. With these strengths, renewable energy technologies are now poised to move into the energy mainstream.

However, despite these substantial accomplishments, there are still the following major issues and barriers:

- Markets and market-support infrastructure for renewable-energy products are still underdeveloped.
- Product development is poor and continues to be largely supply-driven rather than being responsive to user needs.
- Weak links between market requirements (for product development, deployment and technological upgrades) and the research & development processes.
- Limited availability and access to RE based products and credit for procurement, particularly in rural areas.
- Lack of high-quality energy services from renewables (through hybrids or dedicated energy-service companies).
- Lack of long term PPAs (power purchase agreement).
- High costs of RETs including development costs.
- Emerging RETs are yet to establish cost-effectiveness.

In general, Shekhar et al. concluded that widespread consumer acceptance for RETs will come only when (i) there is a product development approach and (ii) these products are able to meet user needs. Furthermore, the linkage between the market requirements and the research & development process need strengthening so as to accelerate the whole process. They make several key recommendation for action:

- Support for market development mainly in rural areas.
- Development of market-support infrastructure to reduce transaction costs of RET implementation.
- Development of innovative financing mechanisms through banking institutions as well as through initiatives such as the Clean Development Mechanism.
- Support to the RET industry focused on development of capability rather than up front subsidy.
- Promotion of entrepreneurship and innovation.

This paper made the qualification that policies to promote renewables should not lump together all technologies and applications. There are different challenges for renewable energy technologies depend on their level of technological maturity and the kind of market that they face – such as between an established grid-connected application like a wind farm and a stand-alone emerging technology like biomass-gasifier based system. Also in policy formulation it is necessary to distinguish between the different requirements for developing and promoting large, centralized systems on one hand and end-user or appliance oriented product development efforts on the other.

A national policy programme to encourage RETs needs to consider both the fundamental common issues such as level-playing fields and financing options, as well as the country-specific barriers and challenges.

---

1 Shekhar, S. (Min. of Power), Kumor, A. (TERI), Shah, C.(TERI). *Promotion and Financing of Clean Energy Options in India*. Presented ot 9th Greening Industry Network (GIN) Conference. Bangkok. January 2001.

For further details contact:
Mahesh Vipradas, Fellow, TERI at vipradas@teri.res.in

RERED: Supplying Eco-friendly Energy for Rural Communities

The Renewable Energy for Rural Economic Development (RERED) Project was initiated in 2002 and builds on the experiences of the Energy Services delivery (ESD) Project (1997-2002) with the aim of widening energy service provision to rural areas using renewable sources by private and civil society investors. The RERED like its' predecessor is implemented by the Government of Sri Lanka, with credit from the World Bank (IDA) and a grant from GEF. The Administrative Unit handling the project on behalf of the government is DFCC bank.

The RERED Project aims to expand not only the use of renewable energy options but also to increase commercial provision of these energy sources. The benefits are seen as: Energising rural economies and improving the standard of living and encouraging investment in the power sector to diversify options and increase competition for greater efficiency and transparency. Investors eligible for RERED can be any private enterprise, non-governmental organisation (NGO), co-operative or individual operating in Sri Lanka.

The types of subprojects that are supported include:

1) Grid-connected renewable energy projects (<10 MW)
2) Off-grid village based renewable energy projects (hydro, biomass, wind)
3) Solar home systems (SHS)
4) A variety of energy efficiency, conservation and demand side management (DSM) oriented investments

The performance targets of this programme are:

- 85MW of grid-connected electricity from mini hydro, wind and biomass: Some of the projects considered for support and assistance include a 22.5 MW wind farm (also as an option for Prototype Carbon Funds), the exploration off-shore wind development, a small scale co-generation/gasification project in the tea industry and larger scale dendro power projects. Further optimising of the standardized small power agreement and the tariffs will also be addressed.
- 100,000 rural homes electrified through solar home systems: This further expands and capitalizes on the middle range solar market popularised under ESD while also promoting smaller systems for poorer households, community applications (clinics, schools, street lighting etc) and commercial uses (water pumping, telecom etc).
- off-grid electricity connections to households through independent mini grids powered by hydro, wind or bio mass: Financing and technical assistance for private sector and civil society groups involved
- Capacity development, awareness and outreach: For financial institutions, service providers and users for greater acceptance and adoption as well as to increase the number of energy service companies involved.
- Balancing emissions: Expected to result in the avoidance of 1.25 million tons of CO^2 emissions.

The Energy Services Delivery Project (ESD) aimed to increase renewable energy services in rural areas with 1) Credit channeled through PCIs to private sector, NGOs and cooperatives; 2) A pilot wind farm; and 3) Capacity building. The ESD project resulted in: 1) Gaining the support of finance institutions and improving finance structures for private investment in renewable energy service delivery, 2) 31MW (inst. capacity) of grid-connected mini hydro projects, 3) Off-grid village hydro schemes serving 4,174 homes (inst. capacity 879Kw), 4)Solar Home Systems that reached 19,200 homes 5) A 3 MW Wind energy project with the Ceylon Electricity Board, 6) Development of a standardised small power purchase agreement that increased private sector investment and 7) Capacity building and technical inputs to increase energy efficiency and technical standards of equipment used

Procedures and Players

The Administrative Unit (AU) is primarily responsible for the administration of the WB/IDA credit line and GEF grant funds, and provision of Project support. Several local banks are involved as Participating Credit Institutions (PCIs) who carry out the disbursement of the sub-loans. They are responsible to ensure that the sub projects are financially and economically viable, environmentally sound and adhere to stipulated engineering standards. The investors meeting the PCI's credit worthiness assessment obtain medium or long-term sub-loans to establish sub-projects and procure assets. There are specified operational guidelines and compliance requirements for all types of sub projects that are financed under RERED.

Technical assistance is available for development and implementation of grid-connected and off-grid renewable energy systems.

All sub-projects financed under RERED are required to comply with World Bank Operational and Safeguard Policies, and the environmental legislation of Sri Lanka. This includes 1) The Environmental and Social Assessment and Management Framework (ESAMF), and the terms of the Central Environmental Authority (CEA) under the National Environmental Act (NEA) of Sri Lanka. In accordance with the CEA procedure, the proponents complete basic questionnaires that are reviewed and determinations are made on further assessments needed. Based on the ESAMP, project specific Environment Management Plans are formulated by the proponents and monitored by the CEA.

As of March 2004, the results of RERED are given in the table below.

	Households	kWs (installed)	Wp
Grid Hydro		47,129	
Grid Biomass		1,000	
Off Grid Hydro	1279	285.6	
Solar Home Systems (SHS)	23, 977		1,126,148 (mean Wp 47)

Sources:
www.energyservices.lk
www-wds.worldbank.org/servlet/WDS_Ibank_servlet
Nagendran, J. 2001. *Sri Lanka Energy Servces Delivery Project Credit Programme: A Case Study*
Nagendran, J. 2003. *Presentation on RERED*

Renewable Energy Technology in Use in South Asia

The following four pages illustrate a few ways in which renewable energy options are being used in the region. Although many of the examples are from India who have the largest renewable energy base, similar interventions are also in use in the other countries of the region.

BIOMASS POWER: Biomass is the most commonly used fuel in the region and more advanced technological applications offer much room for improvement. An estimate indicates that by 2020, 25 % of global energy needs could be met sustainably from biomass at a cost of $2/GJ (RWEDP 2002).

Waste to Energy

Biogas produced by organic waste creates energy for use in the home for lighting or cooking or to power industries making more savings with less waste.

About 12,000 cubic metres of biogas a day is produced from Biomethanation plants installed for treating distillery wastewater (spent wash) at K M Sugar Mills (Distillery) Faizabad, U.P. It is used in a steam-turbine to produce 1MW of electricity that meets the total requirement of the distillery and its residential colony. It has been generating an average of about 4 lakh units of electricity every month.

In Kanoria Chemicals and Industries Ltd., Ankleshwar, Gujarat, biogas from spent wash is used in two internal combustion engines (2MW capacity). The waste heat from the flue gases of the engines is used to generate about 1.5 tonne per hour steam at about 130°C to meet the industries' process heat needs. A H_2S removal plant using bio-chemical technology has also been installed to avoid the corrosion of biogas engines. 10 lakh units of electricity is generated every month.

Sugar Briquettes

Sugarcane fields in India's Maharashtra State generate 4.5 million tonnes of dry leaves each year. The leaves are high in lignin and silica but have no nutrients and are unsuitable for fodder or fertiliser so it is burnt as waste.

The Appropriate Rural Technology Institute of India (ARTI) has developed a kiln that converts it the leaves into charcoal powder. This in made into char briquettes. ARTI has also developed an improved, cooker called the "Sarai" cooker that uses only 100g of briquettes to cook meals that would need about 3Kg of firewood. It is alo a smoke free and reduces emissions.

New skills and a new industry bringing in employment has developed around this technology.

In 2002, ARTI recieved the Ashden Award for Sustainable energy.

Go DENDRO

Dendro power is wood based power through gasification. It uses small wood cubes that can be grown in dedicated plantations, woodlots or in agro forestry systems or on degraded land. The trees used are fast growing species that are coppiced.

A 1MW dendro plant using gasification technology was connected to the national grid in 2003 in Sri Lanka. It is operated by Lanka Transformers LTD and Ceylon Tobacco Company. The tree crops being used are *Gliricidia, Leucena & Acacia*.

Dendro power offers a regenerating power source that can be grown within the country thereby becoming an indegenous source saving foreign exchange and reliance on imported fuels while also increasing tree cover. If properly managed it has zero carbon emissions. The technology required is similar to other thermal power plants. While having positve environmental impacts it has socio-economic benefits for rural development.

Although there are several dendro power applications around the world, it is still an experimental power source. There is an elements of risk in terms of a guaranteed fuel supply as agronomical effects, pests, droughts etc. can reduce the yeilds. If strict monitoring is not in place, it can increase degradation of forests.

Biomass has the flexibility to be converted into liquid, solid or gaseous bioenergy. Wood, agriculture or forestry residue, organic municipal and industrial wastes, through combustion, gasification and bio-chemical processes can produce heat, electricity or transport fuels. These processes use generators, gasifiers, turbines etc used similar to those running on petroleum based fuels and can also be used in combination. They can serve a range of small, medium and large enterprises (ceramics, paddy and saw mills, paper, starch, chemicals etc) and can save money, reduce emissions and reuse waste product

Decentralised Gasifiers

India has made considerable progress in the development and application of Biomass Gasifier Technology that is promoted by the Ministry of Non-conventional Energy Sources (MNES). Since 1997, a 500 kW biomass based power plant installed at Gosaba Island, Sunderbans has generated more than 10 lakh units of electricity. It serves about 650 consumers through a local decentralised network of distribution lines. This power plant is being run on a commercial basis by the Gosaba Rural Energy Cooperative.

Another 500kW unit with 4X125kW gasifiers was commissioned in the remote Island of Chhotomollakhali in the Sunderbans in June, 2001. These are connected to diesel generator sets with load conditions of 70% biomass and 30% diesel. 800 connections are provided in six villages.

Sources: www.mnes.nic.in, www.ashdenawards.org, www.dailynews.lk/2003/08/20/fea04, ist-socrates.berkeley.edu/~rael/kamal.slanka.pdf, www.rwedp.org

SOLAR POWER: South Asia is blessed with abundant sunlight and this is the renewable energy source with the widest scope and geographic coverage. It is a free and inexhaustible fuel source with increasing sophistication and improvements in technology. It has flexibility of operating systems and applications can serve a range ot needs and locations. Further development is needed to increase the reliability of the technologyand to reduce the costs. Given the benefits of savings in terms of foreign currency, pollution, environmental damage it needs conducive policy, incentives, subsidies to promote the uptake of this technology.

Bangladesh and Solar

Due to fiscal concessions, more effective policy, soft loans etc SPV applications has reached around 800 kWp and over 15,000 solar home systems (SHS) around Bangladesh. Applications range from Solar Home Systems (SHS), electrification of markets, schools, health clinics, hospitals, cyclone shelters, micro enterprises (grocery shops, tailoring shops, restaurants, sawmills, rice mills, cellular phone services, barber shops), offices, training centres, rest houses etc, water pumping, water heating, signaling, remote telecommunications, remote rainfall measuring station. A range of Government, Research, Commerical/Private and NGO sectors are promoting the uptake of solar in Bangladesh.

The Local Government Engineering Department (LGED), has increased coverage through their decentralized energy delivery programmes. Under their Sustainable Rural Rnergy (SRE) Project, LGED has set up a solar market electrification in Gangutia growth centre in Thana in Jhenaidha District. This is the first centralized solar photovoltaic system in Bangladesh and it converts DC power into AC power to increase quality. The system can produce 1.8 kW power with daily consumption of 2000 watt-hours for 45 shops, 3 food processing industries, 1 health centre and 1 mosque. O & M is entrusted to a local NGO, Shubashati while the private entrepreneur, who was providing electricity earlier through 2 diesel generators (5 KW each) is now the technician. Each consumer pays Tk.4.00 per day for this service.

LGED has also successfully completed a solar electrification (1.5 kW)at the Kamarul Health Clinic at Kamarul, Khulna District. This offers vaccine refrigeration, lighting, an operating theatre and other related equipment. A TV has also been provided for information and entertainment. The Organization for Health and Community Development (SJS), a local NGO is running the clinic and offers different types of serious operations (like kidney operations). This has been a great improvement for about 50,000 people in this area.

The Sun and Freshwater

Solar ponds for desalinization has been tried in India and in Pakistan. Two plants with 240 stills each with the capacity to desalinate 6000 gallons of sea water per day have been installed in Gawader an arid area in Pakistan. These systems offer a solution for areas facing a shortage of drinking water; a prevelent and pressing problem in this region.

Barefoot Solar Engineers

The Barefoot College in Rajasthan, India has trained villagers as 'Barefoot Solar Engineers', (BSEs) who return to their villages to install solar units and pass on thier knowledge to the communities. In 6 states along the Himalayas a total of 110 BSEs including 22 women, have been trained and they manage 5000 systems. For 15,000 people now using solar, life has changed: they have light and heat. Children can now go to school during the winter, as the BSEs constructed 'solar passive' houses. They have introduced solar drying and spinning wheels that are generating employment and income as well increased food security. It has also reduced use of wood, kerosene, and diesel a boon in a fragile ecosystem. In 2003, the Barefoot College was awarded the Ashden Community Welfare Award.

Worlds Largest Solar Steam Cooker

A new age solar steam cooking system that can prepare meals for around 10,000 people has been installed at Taleti, Rajasthan, by the Brahmakumaris organization (whose workers assembled and installed this system). This cooking device uses automatic tracking solar dish concentrators to convert water into high pressure steam and the steam is used for cooking. It is a modular system with 6 units connected to a central steam pipe line going to the kitchen. Each unit has 14 dish concentrators with a 10 sq.m reflector surface per dish. It is a hybrid as it is connected to a oil fired boiler as backup. It has performed well so far with a maximum of 33,800 meals been cooked in a day along with boiling 3000 lt of water. The system has been reported to save around 400lt of furnace oil at full capacity. This system does not come cheap and needs careful handling. It could be suitable for religious ashrams, temples, gurudwaras, army canteens etc..

WIND POWER After micro hydro power, this is a proven renewable energy resource that can be conneced to the grid or work as stand alone units. Under seasonal wind conditions, they can be used as hybrids which can serve remote locations. The limiting factors are that they require adequate wind speeds (over 6m/s) and therefore cannot be sited everywhere and are at present relatively expensive and require space (either on land or at sea). Certain areas around South Asia have potential to increase the use of wind. India has the largest share of the pie with an estimated 45000 MW.

- India's installed capacity is over 1870MW making India the fifth largest wind users in the world. Indigenous state of the art wind machines are avaialble in India along with the expertise and commercial interest. Wind energy projects get 100% depreciation deduction at the time of installation and flexibility to supply power to third party which is incentive to invest in wind power projects.
- In Bangladesh along the coastal belt wind/pv/diesel hybrids have potential. There is also some interest and initiatives to explore setting up off-shore wind power plants.
- In Sri Lanka a 3MW wind power project that is connected to the grid. While bigger plants are being considered.
- Nepal has a potential of about 200MW in a 12km corridor from Kagbeni to Chhusang.
- In Pakistan wind mills have been used for water pumping.

Harnessing Offshore Wind

The world's largest off-shore wind farm is in "Horns Rev" in the North Sea, about 20 km west of the Danish west coast. It demonstrates the power and potential of off shore wind. This project is run on a commercial basis by Elsam, a Danish company and has 80 x 2MW turbines totalling 160 MW of installed capacity. Turbines placed off-shore has an energy output that is as much as 50% higher than from comparable on-shore turbines. The reduction in CO_2 emissions is approx. 280.000 tons.

This project was awarded an Energy Globe Award in 2004.

MICRO HYDRO (MH) POWER: Micro hydro generates less than 100kW of electricity and are suitable for areas with a low population, low demand, scattered homesteads and limited industrialisation. These systems require little physical and river flow changes, while the equipment is reliable and cost effective and can be constructed locally and this builds a local industry. There is minimal O&M and can be administered by the community. Some of the limitations are that it is a limited power supply that needs a water source. They also have to be custom made for each location. MH schemes are pupular in Nepal, Bangladesh, India and Sri Lanka and has been promoted and implemented by the State private sector and civil society institutions. There is still considerable untapped potential in all of South Asia that can be utilised.

Powering Nepal

Given its terrain and abundant water sources, scattered nature of settlements, decentralised micro hydro power is a viable option for Nepal. The overall potential for hydro is 83,000MW of which 527.5MW has been developed with about 14MW attributed to Micro hydro. Nepal's micro hydro comes from plants ranging from 1kW to 100kW, based on technologies like propeller turbine, cross flow turbine, pelton turbine, multipurpose power unit (MPPU), peltric set, and improved ghatta. Around 2,200 such schemes have been developed servicing 146,000 rural households in Nepal.

The Alternative Energy Promotion Centre (AEPC) is the main national body responsible for promoting decentralised micro hydro while the private sector and NGOs also implement schemes. There is considerable expertise, a manufacturing industry, subsidies and loan schemes to support MH. Some of the legal flexibility inbuilt to promote MH among public & private sectors are that no licenses are required for conducting surveys or for building and operating plants, no royalty on the power generated, exemption from income tax and ability to fix the selling price.

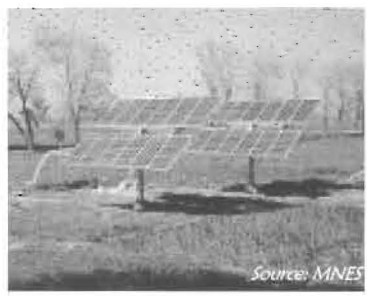
The most common use of MH is for agriculture processes and electricity for homes. The village of Ghandruk in the Annapurna region of Nepal is one of the many villages serviced by a MH scheme. The stream used is no more than a metre wide in the dry season, but it still can generate 50W of power that is adequte for lighting of all the households and for 20% of the village to cook.

A peltric set is a miniaturised and local version of a pelton turbine and is the simplest form of combined turbine and generator. A small quantity of water is dropped from a large height to operate it. It can produce lighting of upto 1kW of electricity for 10-12 rural households), charge batteries or operate appliances. ICIMOD supports the installation of these units.

Power from Canals

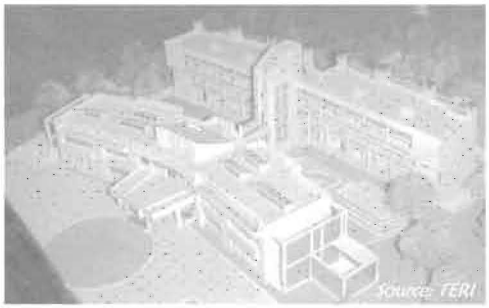
The State of Andhra Pradesh has developed a canal based small hydro power (SHP) scheme with private sector participation. There are over 30 SHP projects aggregating about 65 MW have been set up. This has been possible due to conducive policy in the State.

Improving Traditional Water Mills



The State of Arunachal Pradesh has over 5000 water mills with about 2500 in the District of Tawang. As part of UNDP-GEF Hilly Hydro Project, 50 new and improved demonstration water mills were installed in Tawang district. It has triggered new economic activity and user are satisfied with the design as well as with the increased profit by providing services of the water mills to others. Four local youth have been trained to carry out O&M and the installation of new water mills. A manufacturing unit for water mills has been set up in Guwahati.

Sources: www.itdg.org, www.icimod.org, www.aepcnepal.org, www.reeep.org, www.teriin.org, www.mnes.nic.in; www.ashdenawards.org www.mnes.nic.in www.nepalfriends.org, www.energyglobe.at, swera.unep.net (country products)



TERI's RETREAT

TERI has developed a complex that serves as a model for sustainable Habitats in Gual Pahari, Gurgaon (South of Delhi). This complex known as the RETREAT was built on 36.5 ha of wasteland that through intense planting activities has been converted into fertile land with lush vegetation. The building successfully integrates a variety of renewable energy sources and sets a precedent for the types of buildings needed today.

- By making use of these natural features and processes the RETREAT cut down the electricity requirements by about 60% with only marginal dependence on the grid.
- Solar power is used to 24 solar water heaters that provide 2000lt of hot water for the living quarters, a water pump and as the main source of power at night (through a battery bank).
- A biomass gasifier that uses wood energy twice as efficiently as conventional gasifiers, provides energy during the day and the fuel sources are all from within the campus itself. The surplus energy is used to recharge the battery bank.
- The underground earth tunnels help maintain the tempereture inside the building between 20° C - 30° C throughout the year. Each space/room has a solar chimney that creates an air current. Once the warm air rises towards the chimney, it is replaced by cooler air from the tunnels (that have two blowers to assist with air circulation). This is reversed in winter.
- A "Root Zone" waste-water recycling system allows the reuse of waster water for irrigation. Sewage is collected in a settling tank and the water and sludge is separated. The water passes through a bed of soil and reeds. The roots of these reeds act as a filter and remove or absorb some of the toxicities in the waste water and makes it suitable for irrigation.
- Water conservation and efficiency is also addressed through rain water harvesting systems, efficient flushing systems, aerated taps with pre set rates, a centralized laundry and other amenities.

The Renewable Island

The MNES and the West Bengal Renewable Energy Development Agency (WBREDA)along with private power suppliers with financial support from IREDA and the World Bank has ve given clean power to Sagar Island in the Sundarban Region. Until 1996 their main source of power was Diesel generators. The first 26 kWp SPV Power Plant was commissioned in Kamalpur with just 19 consumers and now it has grown to 300 kWp for around 2,000 families. The SPV plants are operated as commercial ventures by local co-operatives. They charge the consumer a connection fee and a monthly tariff depending on the loads. A special feature of these power plants are that they are integrated into the water supply system and powers low cost conventional water pumps of average 3 HP capacity during the day to provide drinking water. Solar power constitutes more than 50% of the total electricity consumed in Sagar Island.

The other power source introduced here is wind together with Auroville Wind systems and external funding from the Indian Canadian Environment Fund. A hybrid wind-diesel power plant is operational in the Southernmost point of the island. It generates 500 kw from wind and 280kw from diesel. This is the first high penetration integrated Wind Diesel Technology project. This is possible due to the specially designed controller called the Wind-Diesel Integrated Control System (WDICS) that manages the fuel options and keeps the system stable while also offering considerable fuel savings. It is used primarily for lighting, domestic use, educational centres and power supply to small industries. In times of high wind velocity excess power will be used to operate an ice plant as requested by the fisher community.

H_2 Powered Two-Wheelers

Hydrogen produced through biological conversion of organic effluents or by electrolysis of water can be used as a clean energy source as the only by product is water vapour. It can be used in homes, industries, agriculture and transport. Hydrogen energy can replace hydro carbon fuels in many applications and thereby reduce the green house gasses and the pollution especially in highly congested urban area.

There are several demonstration projects by the MNES in operation and one such project is to use hydrogen in fuel cells to power motor cycles and to identify methods for the storage of hydrogen for vehicular applications such as motor cycles, power generating units and catalytic burners for domestic and industrial applications. The Banares Hindu University (BHU), Varanasi, are involved in demonstrating and field-testing 50 hydrogen fueled two-wheelers. Each vehicle requires about 20-25kg of hydrogen storage material to cover a distance of up to 100km. The MNES envisions deployment of these vehicles in large numbers while also promoting the adoption of this technology in the Tenth Plan of the Government of India.

Other R&D Done on Hydrogen Power:

The biological production of hydrogen from organic wastes that was used for on-site generation of electricity by a small fuel cell system.

The production of hydrogen from water using low cost photo catalysts and solar energy and also through septum cells (at BHU)

Sources: www.teri.org, www.mnes.nic.in, www.aurovillewindsystems.com

SWERA: Mapping Solar and Wind Regimes

The Solar and Wind Energy Resource Assessment (SWERA) is a GEF co-financed project, implemented by the UNEP in several countries. The aim of SWERA is to increase accurate information for decision-making, and increase investors' interest and confidence in renewable energy projects. SWERA is also aiming at transforming the ability of developing countries to assess the technical, economic, and environmental potential for large-scale investments in solar and wind energy projects.

Three South Asian countries - Bangladesh, Nepal and Sri Lanka are involved in the project with The Energy and Resources Institute (TERI) of India acting as the coordinating body. TERI is also the lead agency for application of the SWERA tools and information, including developing alternative scenarios in energy supply. The wind and solar assessments in South Asia are being developed through partnerships of key national organizations and agencies, in collaboration with international counterparts:

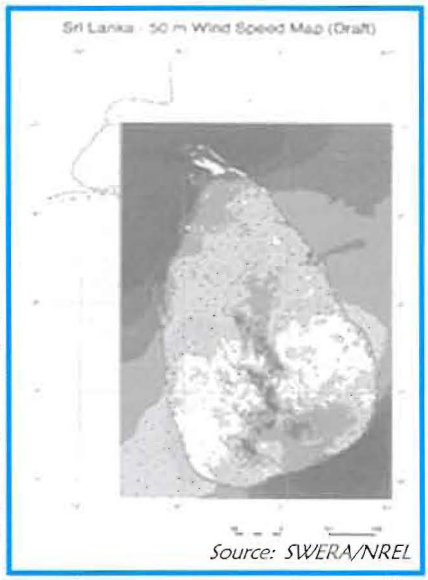
International partners: Risø National Laboratory, German Aerospace Centre, and the National Renewable Energy Laboratory.

National partners: The Renewable Energy Research Centre (RERC)-Bangladesh, The Tribhuvan University, The Ministry of Science & Technology, The Alternative Energy Promotion Centre (AEPC) and The Centre for Energy Studies (CES)–Nepal, The National Engineering Research & Development Centre (NERDC) and the Ceylon Electricity Board (CEB)–Sri Lanka.

The major outputs of SWERA include:

- **Consistent, reliable, verifiable, and accessible global data for international and in-country investors and other stakeholders** – SWERA will enhance existing measurement activities by providing tools to accelerate the development and deployment of solar and wind energy projects
- **Better targeting and increased confidence associated with investment and development decisions for solar and wind energy projects** – SWERA will work to reduce the uncertainty surrounding the design, cost, and performance of solar and wind energy systems towards increasing the confidence of investors and of key stakeholders, such as government agencies responsible for facilitating clean energy development.
- **Increased awareness among key stakeholders and decision makers of the potential to utilize solar and wind energy resources** – This is aimed at promoting the inclusion of solar and wind energy technologies in the energy planning process.
- **Increased capacity at the local, provincial, national, and regional levels to plan for solar and wind energy projects** – For the availability of high quality data, and skills to facilitate better planning for solar and wind energy development and to increase access to project developers and energy planners of more comprehensive picture of renewable energy resources.

SWERA's mapping exercises give in-depth solar and wind resources for participating countries as well as a regional perspective. Products for each country in include:1) A high (10-km) resolution solar map, 2)A medium (40-km) solar map, and 3) A 5-km wind map (only off-shore for Bangladesh).



Source: SWERA/NREL

This information will be assembled into widely usable CD-ROMS, and incorporated into a user-friendly geo-spatial toolkit. These mapping exercises can be used by national collaborating partners as a means to attract investors while also contributing to a better analysis of global solar and wind energy resources. In order to demonstrate the outputs of SWERA, national energy planning and investment alternatives for solar and wind energy development will also be undertaken.

The activities in each country have proceeded at various speeds due to sequencing and financing factors. Sri Lanka and Bangladesh have performed Wind Analysis and Assessment Program (WAsP) analysis for several locations. Activities in Bangladesh have been under implementation for the longest period and have led to improved capacity and technology (RERC) and better validation of data. The WAsP analysis has also allowed them to identify better placement of measurement locations. The SWERA project will assist the UNDP project in identifying wind measurement locations. The RERC has proven that with the skills and technology inputs these assessments can be sustained in the long run. Through consultation and engagement RERC will leverage other organisations for increased outputs. The capacity to do detailed wind site analysis (WAsP) will enhance wind project development in Bangladesh.

In Sri Lanka the SWERA maps and WAsP analysis were used to measure performance of a 3MW wind farm and to identify suitable sites for wind farms in the country. Solar measurement activities have also been undertaken. Further collaboration between the national bodies, donor agencies and energy developers is taking place to promote private investments into wind and solar as alternatives to fossil fuels as well as for rural electrification in Sri Lanka. Nepal is still in the preliminary stages of SWERA implementation.

RETScreen trainings have been conducted (42 participants) and have been well received with requests to expand the training to include small hydro and biomass and to engage more private sector developers. The absence of wind/battery storage and wind/diesel capability in the software was noted. The project participants expressed interest in more face-to-face meetings and noted that website access was difficult.

For further Information visit:
http://SWERA.UNEP.Net.

Combatting Land Degradation Through Regional Co-operation

A workshop on the *Development of the South Asia Sub-regional Action Programme for Combating Desertification and Promoting sustainable land management"*, was held from 5-7th July 2004, in Sri Lanka under the patronage of UNCCD and the Government of Sri Lanka. It brought together stakeholders from South Asia to finalise this Action plan.Ms Nishanthi Perera (Programme Officer), for SACEP presented a paper on Sustainable Land Management: South Asia Perspectives that highlighted Land use patterns, causes and consequences, and regional initiatives. Some of the salient features follow:

- From the total land area in South Asia Arable and Permanent cropland occupies 39%, Permanent Pasture 11% and Forest land is 17% which is the 2nd lowest forest cover in the world and as much as 45% of this is woodlands and forest plantations. Protected areas amount to just 5% of total land cover.
- Agriculture takes up 50% of the land area and contributes about 25% to region's GDP, a declining percentage over time. But 60% of the labour force is still engaged in it with production largely for subsistence.
- South Asia has only 3% of the world's land area but is home to 20% of the world's population. At present most human settlements are rural with only 28% urban but the UN forecasts 53% urbanization in Asia by 2025. Five of the largest megacities in the world (Mumbai, Kolkata, Delhi, Karachi, and Dhaka) are in South Asia and these and many others suffer from a severe lack of infrastructure facilities, inadequate waste disposal, pollution, and health hazards.
- Land degradation is costing the countries more than US$ 10 billion per year - the highest in the Asia-Pacific region.
- Direct causes of land degradation are poor agricultural practices, overgrazing by livestock, unchecked industrial activities and deforestation.

- Underlying causes of degradation are expanding population, poverty and high dependency on natural resources, and institutional and policy failures.
- South Asia's population density is 15 people/ha compared to world average of 4 people/ha and three of the world's 10 most populous countries, are India, Pakistan and Bangladesh.
- Half a billion people in South Asia are said to earn less than a $1 a day and land shortages, dependency on small-scale farming, and lack of alternative or adequate incomes has led to non-sustainable land use practices.
- Shifts in production from subsistence towards commercial products and industries is reducing concern for long-term sustainability and pushing subsistence farmers into areas into fragile areas with increase use of chemicals.
- South Asia is plagued with natural hazards and climate change effects that are worsening in magnitude and increasing in frequency.
- Regional objectives for better land management include:
  1) Meeting the food security of increasing populations.
  2) Advancing sustainable agricultural practices and productivity through R&D, technology, value addition and extension service etc,.
  3) Provisioning of alternate, supplementary and economically viable employment for rural poor.
  4) Combating the widespread neglect of rural infrastructure development.
  5) Addressing transboundary issues for more equitable distribution of benefits.
  6) Integrating water and land management.
  7) Meeting the growing energy demand through energy efficiency and more ecofriendly options.
  8) Promoting and practicing multi-stakeholder actions to build relationships, ownership and a sense of responsibility while also increasing the physical resource base for actions.

for more details see see www.unccd.int/regional/asia/meetings/meetings.php

Announcements sent in:

From the Editor of IWMI's Water and Food Monthly Newsletter (CPWF)

They say good things come in threes and this issue elaborates on a recommendation to fund our CP by the G8, the Copenhagen Consensus declaring 'research to increase water productivity in agriculture' and a grant from DFID to fund a number of additional projects and increase the budget for 'central theme and basin activities' In this issue we also have a new column to facilitate active knowledge-sharing, news from the Themes & Basins, project profiles from the Karkheh basin, news from the secretariat and more...

For details contact: Sanjini de Silva , Editor, Water and Food Monthly at sanjini.desilva@cgiar.org

A Simple Scorecard for MPA Management

Called the "Score Card to Assess Progress in Achieving Management Effectiveness Goals", it is not intended to replace more thorough methods of assessment. Rather, it provides managers with an overview of the progress of their management efforts and illustrates gaps in management that should be addressed. It is designed to be filled in by managers or other site staff, and is adaptable to site and regional needs. The scorecard was adapted from a similar tool created for terrestrial protected areas by the World Bank and WWF. An early version of the MPA scorecard was tested at various sites in 2003. It is available online www.mpascorecard.net (in pdf).

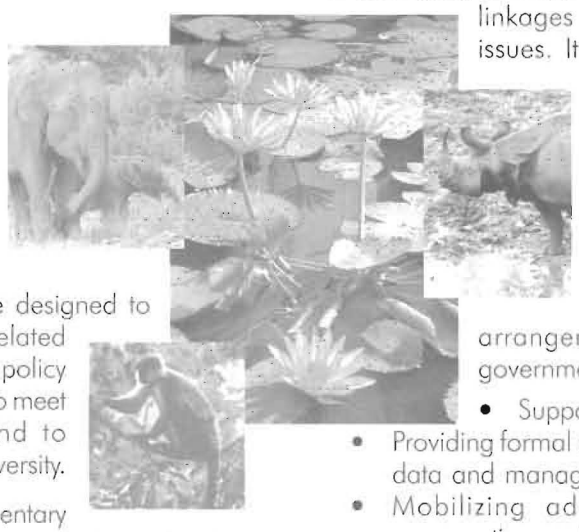
For details: Francis Staub *(scorecard co-author)*, AJH Environmental Services at staub@environmentservices.com

New Initiatives at SACEP

Development of a Regional Biodiversity Clearing House Mechanism for South Asia

SACEP has begun development of a regional biodiversity clearing-house mechanism (CHM) website for South Asia. The website will be a resource for promoting biodiversity conservation and sustainable use within the region. The CHM will be of value to member countries by providing a mechanism for enhanced regional and inter-country information transfer and experience sharing in the field of biodiversity.

The first step in this development has been the establishment of a working partnership with the Royal Belgian Institute of Natural Sciences, the Belgian National CHM Focal Point. The Belgian CHM Focal Point has a dedicated partnering role for assisting developing countries in establishing their national CHM websites and has facilities to host these websites for an initial period. The Belgian CHM team has already supported the development of many national level CHM sites and has several years of experience in capacity building activities for the CHM in Africa and Asia.



National and regional CHM activities are conducted under the umbrella of Convention on Biological Diversity (CBD) CHM. National CHM websites of the signatory countries, administered by the national CHM Focal Point, are an important component of the CBD CHM. National websites are designed to contain all national biodiversity-related information that is required to assist policy makers and interested stakeholders to meet obligations under the CBD and to conserve and sustainably use biodiversity.

A regional CHM website is complementary to constituent national CHM sites, concentrating on biodiversity issues of transboundary scope and significance. At the recent Conference of Parties of the CBD (COP7), the COP invited parties "...to develop regional clearing-house mechanisms to further promote and facilitate technical and scientific cooperation and the exchange of information on technology transfer at the regional and national levels".

SACEP has taken up the challenge of developing the regional CHM for South Asia, in line with SACEP's Strategy and Work Programme (2003-2008). This Strategy advocates the enhancement of regional cooperation in the area of biodiversity, covering components such as study and assessment, exchange of experience and training and capacity building. SACEP is seeking to have the first version of the CHM operational by October 2004 and will be located at www.sacep.org.

For more information contact:
W A Rathnadeera at rd_sacep@eol.lk

A Regional Arrangement for Conservation and Wise-use of Wetlands in South Asia

South Asia is home to a large number of wetlands, ranging from high altitude glacial lakes in the Himalayas to the coastal mangroves and coral reefs. They play a crucial role in terms of biodiversity they support and in sustaining the livelihoods of millions of people in the region. These wetlands are severely threatened by the impacts of increasing human population, the high economic expansion of the region as well as climate change.

SACEP has recently prepared a policy paper highlighting the potential benefits of a regional arrangement under the Ramsar Convention on Wetlands for cooperation and collaboration for the conservation and wise use of wetlands in South Asia.

This collaborative arrangement would add value to national efforts in areas such as the management of transboundary wetlands, conservation of migratory and common species, enhanced coordination between international and regional wetland programmes, data and experience sharing and inter-linkages between MEAs addressing wetland issues. It could also be used as a forum to mobilize assistance for non-signatory parties to sign and ratify the Ramsar Convention and to designate wetlands of international importance. This arrangement is not aimed at building new institutions, but to enhance communication and collaboration amongst existing mechanisms. This arrangement can add additional value to governments of the South Asia Region through:

- Supporting and enhancing national activities.
- Providing formal mechanisms for accessing information, data and management advice.
- Mobilizing additional resources for wetlands conservation and wise use in the region.

A South Asian regional arrangement could be modelled on the existing MedWet Initiative, which mobilize partners and funds to assist in the implementation of the Ramsar Strategic Plan in the Mediterranean region. The structure and modalities of the South Asian operation needs to be determined through detailed consultation between all stakeholders. SACEP, the intergovernmental programme for the region mandated to promote cooperation towards achieving the goals of sustainable development and environment protection could play an important role in initiating this collaboration.

SACEP is in the process of distributing this paper to member countries for comment. The concept has received positive feedback from the Ramsar Secretariat. This will be a discussion item for the next SACEP GC Meeting, in preparation for the next Ramsar Convention COP in 2005.

For more information contact:
Nishanthi Perera at np-sas@eol.lk

Fostering the Spirit of Co-operation: A SAARC - SACEP MoU

A MOU between SAARC and SACEP was signed on 08 July 2004 by H.E. Mr. Q.A.M.A. Rahim, SAARC Secretary General and Mr. Mahboob Elahi, Director General of SACEP.

The MOU has been signed pursuant to the decisions taken by the Council of Ministers of SAARC and the Ministers of Environment, and the Governing Council and Consultative Committee of SACEP.

The MOU will constitute a framework of cooperation between SAARC and SACEP in the area of environment protection consistent with the SAARC Charter and the mandate of SACEP. It provides for the two organizations to cooperate including developing mutually supportive arrangements to implement their respective Environmental Programmes and Action Plans; exchange information on the state of the global and regional environment and emerging environmental issues; collaborating in producing studies and reports on priority concerns in the field of environment; and strengthening capacity for effectively addressing global, regional and national environmental concerns, including through participation in multilateral environmental negotiations and the environmental agreements.

South Asia with its increasing population and expanding economies are facing myriad problems in safeguarding its natural resource base. Therefore, this framework of cooperation between SAARC and SACEP reflects the vision of the region to face the challenge of sustainable development. It is also a realization of the importance of capitalizing on the separate strengths of the two organizations to address environmental issues.

Some of the areas identified by SACEP for possible collaboration are:

Under i) Promoting regional coordination and cooperation in agreed areas of mutual interest, and ii).Developing mutually supportive agreements to implement their respective Environmental Programmes and Action Plans:

- Establishing a collaborative arrangement between the South Asian Seas programme and the proposed SAARC Coastal Zone Management Centre in Maldives
- Development of a regional arrangement for protection and management of shared resources: e.g. water resources and wetlands (See pg 11).
- Taking forward the South Asia Sub-regional Action Programme for combating desertification and promoting sustainable land management for which a draft action plan was developed with assistance of the UNCCD secretariat.
- Development of a regional centre for the management of hazardous wastes under the Basal Convention.
- Development of a Regional Sustainable Development Strategy and a council to address the Millennium Development Goals (MDG): SACEP can assist SAARC in addressing the MDG goal 7.

Under iii) Exchange information on the state of the global and regional environment and emerging environmental issues and iv) Collaborating in producing studies and reports on priority concerns in the field of environment:

- Collaboration in preparing the State of Environment Reports: Follow-up of first round of SoE reporting (UNEP-SACEP) with issue specific reports focusing on key regional issues such as biodiversity conservation, water resources management, land-degradation, coastal and marine resources management, environmental disasters, energy issues, food security and livelihoods.
- Preparation of a joint report addressing Environmental related health issues (vector borne, water borne, respiratory diseases, and health issues associated with food)

Under v) Strengthening capacity for effectively addressing global, regional and national environmental concerns, including through participation in multilateral environmental negotiations and the implementation of multilateral environmental agreements:

- Co-hosting regional preparatory meetings for key Multilateral Environment Agreements and Environmental Negotiations to identify common regional positions.

This newsletter is distributed free of charge to Government Agencies, NGOs, International Organisations, Donors and other Civil Society Groups in South Asia and beyond.

We welcome your feedback or news items and articles that you wish to share with our readers.

South Asia Co-operative Environment Programme (SACEP)
No.10, Anderson Road, Colombo-5, Sri Lanka.
Tel: 94-11- 2552761/2589787 Fax: 94-11-2589369
Email: np-sas@eol.lk or sacep@eol.lk

For more information about SACEP visit our website: www.sacep.org