

Tiempo

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Cover photo: A woman feeding her biogas digester

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Collecting water in Nepal

Photo: John Soussan

Climate impacts on Nepal

Anil Raut discusses the impact of climate change on Nepal and options for adaptation

The climate of Nepal varies from arctic to tropical within a 200km span from north to south. This variability of climatic conditions within a short distance and limited area has blessed this beautiful mountainous country with a high diversity of flora and fauna as well as a plentiful supply of water resources.

Nepal has a negligible share in global emissions of greenhouse gases. This, together with the fact that its fragile mountain ecosystem is particularly vulnerable to climate change, is why Nepal needs to focus on adaptation measures rather than those of mitigation.

Nepal's major natural resources, biodiversity and water, are at the forefront of climate vulnerability. Analysis of mean monthly river discharges, for example, shows that global warming would melt snow cover on the mountain tops earlier, thus shifting the peak discharge month from August to July. This

could lead to increased flooding as well as more pronounced variations in water availability throughout the year.

There are a number of sectors in which climate impacts on water resources will affect Nepal, such as natural disasters, hydropower and irrigation. Of these, it is the potential increase in climate-related disasters, particularly from glacial lake outburst floods, that is perhaps the most prevalent threat.

The formation and growth of glacial lakes is

MAIN POINTS

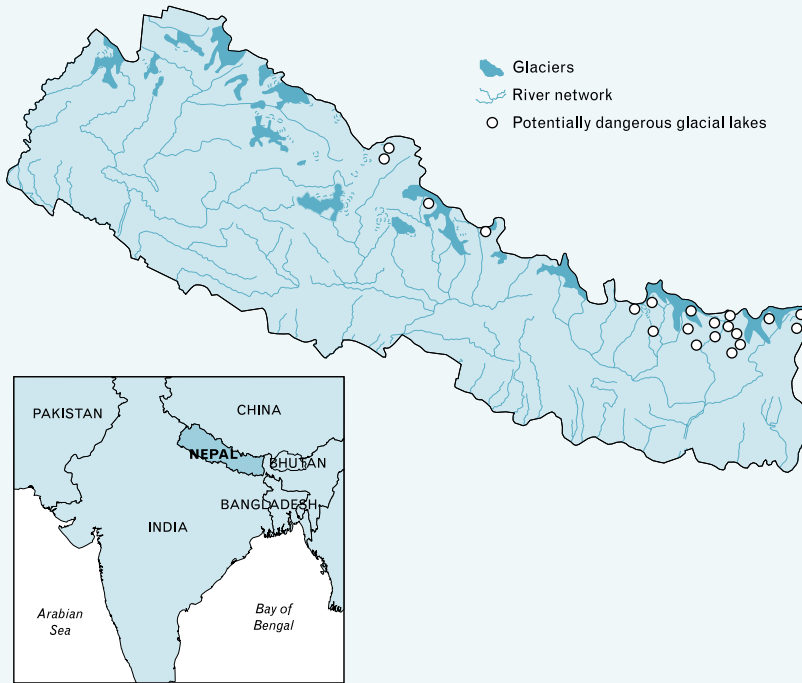
- **The author considers** the characteristics of Nepal that determine its vulnerability to climate change.
- **Increasing awareness** has led to numerous adaptation options being proposed and a number already implemented.
- **Civil society** in Nepal must play its part in finding ways to integrate climate adaptation with the current development process.

closely related to deglaciation. Valley glaciers usually contain a supra-glacial pond which can substantially increase in size through the melting of glaciers and any warming in climate. The moraine walls that act as dams are structurally weak and unstable. Growing pressure on this natural dam can lead to catastrophe through glacial lake outburst floods.

Out of 2,323 glacial lakes in Nepal, 20 have been found to be potentially dangerous because of the apparent potential for glacial lake outburst floods. The most significant such event, in terms of recorded damage, occurred on August 4th 1985. A glacial lake outburst flood caused a ten to fifteen metre high surge of water and debris to flood down the Bhote Koshi and Dudh Koshi rivers for 90 kilometres destroying, amongst many things, the Namche Small Hydro Project.

Climate also plays a major role in determining the feasibility of hydropower projects.

GLACIERS AND GLACIAL LAKES IN NEPAL



Source: UNEP/ICIMOD

Both the Bhote Koshi and the Dudh Koshi rivers have their headwaters high in the Himalayas. Nepal has the potential to generate around 43,000 megawatts of hydroelectricity taking account of the contribution of all the

country's rivers. But if a river's discharge is always unpredictable there will continually be problems and failure in any design of hydropower plants. Not only will there be problems in designing hydropower plants

to account for a highly variable water supply, but extreme events such as glacial lake outburst floods will also physically damage or destroy the power plants.

As 80 per cent of the Nepalese population depends on agriculture, any changes in climatic conditions affecting rainfall patterns will have an adverse impact on the livelihoods of most of the Nepalese people. This means that there is always the high risk of food insecurity.

The majority of the population is directly dependent on a few crops such as rice, maize, and wheat. Most of the farmers are reliant on rainwater for irrigation as the country lacks major facilities for artificial irrigation. Farmers, therefore, prepare their cropping calendar according to the experience they have with both the intensity and the time of rainfall. Any significant changes to this pattern will lead to loss in crop yield.

There is a clear need to educate farmers on the possible effects of climate change, particularly in regard to changing rainfall patterns. A cropping technique for rice such as the System of Rice Intensification, together with crop diversification, is one important alternative that should be promoted. It requires less irrigation than conventional farming practices. The government also needs to provide assistance to the farmers in establishing alternate means of irrigation.

Vegetation patterns would also be altered by changes in temperature and precipitation. This, in turn, would affect biodiversity.

Vegetation patterns and distribution would be different under any changed climatic scenario. Not only would the diversity of plants be affected but also the animals which live within a particular habitat.

Increased disasters, particularly from floods related to glacier melt, would directly impact on human health. Diseases such as malaria and Japanese encephalitis may also increase their impact through expanding to new regions. The current lack of primary healthcare for large portions of the population also contributes to their vulnerability. Future climate change and the possible impact on human health needs to be considered now and national support, education and comprehensive coping strategies should be initiated through the establishment of widespread primary healthcare centres.

As a response to the increasing awareness of Nepal's vulnerability to climate change, numerous adaptation options for various sectors have been proposed and many already implemented. One major project that focuses on glacial lake outburst flood mitigation has been undertaken in the Tsho Rolpa glacial lake area. With the support of The Netherlands, the Nepalese government undertook a project to drain and reduce the depth of the Tsho Rolpa glacial lake by three metres. This reduced the risk of a glacial lake outburst flood by 20 per cent. A major aspect of the design was that a channel was cut into the moraine, and a gate was constructed to allow water to be released as necessary. ■

For other potential glacial lake outburst flood sites, an early warning system has been proposed for the people living downstream. In conjunction with an engineering project that was undertaken between 1998 and 2002 to reduce the risk of a glacial lake outburst flood occurring on Tsho Rolpa, an early warning system was simultaneously established in nineteen villages downstream of the Rolwaling river. Local villagers have been actively involved in the design of this system to ensure that they feel safe from the potential glacial lake outburst flood event and at the same time to be aware about the potential damage.

Certain glacial lake outburst flood mitigation measures can provide additional benefits. For example, micro-hydropower and drained off water could also be used to supplement dry season flows. This strategy could also help to maintain adequate water levels in downstream ecosystems to protect valuable fish stocks and in the supply of water for local usage.

It is too soon to comment on the results of any government action on these adaptation measures. At the moment, one important activity that needs to be urgently focused on is the identification of the nation's vulnerable sites and sectors and proposals need to be devised for appropriate adaptation measures consistent with development priorities. Civil society in Nepal must also play its part in finding ways to integrate adaptation to the possible impacts of climate change with the current development process. ■

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FURTHER INFORMATION

● **In the Cyberlibrary:** The Tiempo Climate Cyberlibrary presents a listing of theme sites on mountains and climate change at www.tiempocyberclimate.org/portal/t4445web.htm

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Electric vehicles in Nepal

Megesh Tiwari discusses the development of the use of electric vehicles in Nepal and current initiatives that are expanding their use across the transport sector

Modern civilization is based on an economy that depends heavily on an adequate supply of energy. There has been a huge reliance on fossil fuels to meet the energy needs for the industrial, household and transport sectors throughout world society. These resources are, however, limited and global discussions have begun on how long they will last and what alternatives are feasible.

According to the United States Energy Information Administration, the world demand for oil in 2005 averaged 83.7 million barrels per day. The forecast for consumption through 2006 is 85.3 million barrels per day and for 2007 it is 87.2 million barrels per day. Between 2003 and 2005, there was a 2.22 per cent growth in the demand for oil. If this growth rate persists then efforts to meet the increasing demand will, apparently, cause worldwide oil reserves to be drained by 2028.

We are very close to depleting global oil reserves on the supply side and will be increasingly prone to harsh economic pressures on the demand side.

Historically, Nepal has imported all of its petroleum products and relies almost entirely on fossil fuels for transportation. This sector depends heavily on imported oil from India. Oil prices increase every year with the result that the Nepalese government has to continue, and has even had to increase, the

MAIN POINTS

- **The author discusses** the use of electric vehicles in Nepal.
- **He describes** developments over recent decades and the potential for further initiatives in this sector.
- **It is concluded** that a massive increase in the electrification of the transport system can be achieved through the utilization of Nepal's hydroelectricity potential.

amount of subsidy being provided. Cross-border price differences have also given rise to the smuggling of cheap oil from Nepal to India. These factors, amongst others, have resulted in a drain on the foreign reserves of the country which come from hard-earned public revenues. This, in turn, causes Nepal to become poorer by the day.

It is high time we utilize fully the possibilities in energy alternatives so we can survive the tremendous economic threat inherent in the impending oil crisis.

The transport sector is the largest consumer of petroleum products in Nepal and is also a major economic driver. This is a significant incentive for Nepal to be more electricity oriented in meeting its energy needs. Hydro resources in Nepal have the capacity to generate 42,000MW of electricity. In view of this, it is obvious that hydroelectricity is the best alternative energy source that can meet the energy demands of the transport sector. A

massive increase in the electrification of the transport system can be achieved through the utilization of Nepal's hydroelectricity potential.

Most hydropower plants in the country are of the run of the river type and have a low grid load factor (that is, low efficiency of use) with a huge chunk of electricity going to waste during off peak hours (night time). There are major possibilities for using this unused electricity to charge batteries that can be used to operate battery-powered electric vehicles during the day time.

There is, in fact, a long history of transport powered by electricity in Nepal. In the 1960s, the first electric ropeway was installed to transport goods from Hetauda in the south to Kathmandu. A ropeway is a rope or cable-based transport system used in mountainous areas. The ropeway system consists of steel cables connected to poles with passenger/goods-carrying gondolas sliding along the cable. This traction system can be powered either manually or by a motor.

In 1975, the government of the People's Republic of China installed the first electric vehicles used for public transportation in Nepal, a 13km-long electric trolley bus system with 22 buses to start with. In 1997, ten more buses were granted by the Chinese government to meet the increasing passenger demand. These electric trolley buses provided an excellent and dependable service to commuters.

Though the electric trolley bus system has



Safa Tempo, electric three-wheeler, on the streets of Kathmandu

Photo: © Winrock International, Nepal

been running for the past 30 years, a lack of proper maintenance and management is now ruining this once highly-accredited service. Most of the buses have been grounded, primarily through a lack of available spare parts. The service has been reduced to a 5km-route, with only three buses at present.

Organizations such as the Kathmandu Electric Vehicle Alliance (KEVA) and Winrock International, Nepal, have offered assistance in the areas of technology, business development, awareness raising and policy advocacy to revive the ailing electric trolley

system. But what the trolley bus requires at the moment, to rehabilitate the system, is a competent management structure to operate under an innovative business plan that maximizes investments. The electric trolley bus system could reclaim its popularity if operated under a public-private partnership. Initiatives are ongoing to develop such a partnership, thereby recreating a successful electric trolley bus-based public transport system in Kathmandu.

The development of battery-operated electric vehicles started in 1993 when the United

States-based Global Resources Institute, with funding from the United States-Asia Environmental Partnership, the National Association of State Development Agencies and United States Agency for International Development/Nepal, started the work of converting commonly-available diesel three-wheelers into battery-operated three-wheelers.

Commercial manufacturing of battery-operated electric three-wheelers, commonly known today as 'Safa Tempos', began in 1996 when a private company called the Nepal Electric Vehicle Company was established. Production of Safa Tempos boomed after the government decided to ban the ultra-polluting diesel-operated three-wheelers from the Kathmandu valley. Most of these polluting three-wheelers were converted into Safa Tempos.

A decade later, the number of Safa Tempos running in the streets of Kathmandu has exceeded 600 and the number of these vehicles is continually increasing. Whilst most of these Safa Tempos operate within the public transportation sector in Kathmandu, many also operate as office vehicles, maintenance vehicles, tourism vehicles and waste collection vehicles. Safa Tempos are also being used widely in Nepal by ministries, diplomatic organizations, donor organizations, municipalities, media organizations and public and private organizations.

Most Safa Tempos are used to ferry commuters within the Kathmandu Valley. Each Safa Tempo travels a distance of 100 to 120kms

In March 2006, the Kathmandu Environmental Education Project completed a report on *Promoting Electric Vehicles in Tourism Industry*. Based on a wide-ranging survey, the results clearly indicate that electric vehicles as a means of transportation throughout the tourist industry would be very well received, not only by tourists but also by hotel and travel entrepreneurs. There was overwhelming agreement that the use of such vehicles would greatly enhance the air quality in Kathmandu.

Tourists consider air pollution as a major problem in Kathmandu and 59 per cent reckoned vehicular emission a major source of air pollution. Some considered that bad road network conditions and solid waste added to the problem. Sixty-nine per cent rated the air quality of Kathmandu as poor, while tourists who have been to Nepal on more than one occasion (29 per cent) stated that the air quality had declined as compared to their last visit.

The majority of tourism entrepreneurs, 70 per cent,

considered air quality in Kathmandu to be poor. They also stated that 45 per cent of tourists who come to Nepal for the first time consider air quality to be good. However, this assessment changed drastically after a city tour or a longer period of stay in Kathmandu valley. They also mentioned that in some instances tourists have shortened their stay in Kathmandu because of pollution.

When asked if they would use electric vehicles if they were available, 93.7 per cent of tourists questioned answered that they would and 79 per cent said they were prepared to pay higher fares for this service. Many respondents also pointed out that electric vehicle routes from the airport to the city and also to cultural sites would be very welcome.

The local tourist industry showed a considerable degree of awareness of the potential for electric vehicles. Ninety-seven per cent thought that the use of such an environmentally-friendly product would be extremely effective because the majori-

ty of tourists would choose an eco-friendly option when it is offered.

The majority of respondents suggested that the Safa Tempos could be modified in their comfort and services so they would be even more attractive to tourists and that the widespread availability of electric vehicles for transportation in the tourist industry could be made into an important and effective advertising feature.

Finally, respondents claimed that there is a dire need for the government to implement strict and strong control measures to curb pollution. As well as stricter emission control, government needs to act to improve road conditions, declare cultural heritage sites as vehicle-free zones, promote and support electric vehicles, ban vehicles in certain parts of the cities and ensure proper waste management. Tourism entrepreneurs must also recognize their responsibility.

In summary, the prospect of zero-emission vehicles will have a positive impact on tourism.

each day on two sets of batteries. A battery set contains twelve six-volt deep cycle lead acid batteries with a full charge capacity of 185 ampere hours. These batteries on full charge show 77 to 79 volts, then discharged to 72 volts during operation. After the first set of batteries has completed 50 to 60kms, the Safa Tempos return to the charging stations where the other battery set is loaded onto the vehicles for an additional 50 to 60kms of operation.

Through this system, Safa Tempos have been providing a cheap and dependable form of transportation to the people of Kathmandu. On average, 100,000 passengers travel by Safa Tempos every day. For its size of city, Kathmandu most probably uses the largest

Recently, five REVA electric cars were imported into the country through private organizations. REVA is an electric car company based in Bangalore, India, and is the only car from India to have received European Union certification.

Hulas Motors, the only automobile manufacturer in Nepal, came out with its first five to ten passenger electric van on March 23rd of this year. This model is the electric version of the regular model, the Mini V, manufactured by the company. This electric vehicle is owned by and is being used as an office vehicle by Winrock International, Nepal. Other local electric vehicle manufacturers are also working on four wheel and alternating current drive-based electric vehicles.

company's regular models and it is bound to find markets for use in public and private transportation, as office vehicles, school vehicles, hospital vehicles and in many other sectors of society. Vans are a popular mode of public and mass transportation in Nepal, which should ensure that the Hulas Mini electric vehicle grabs a significant share of this market.

Prospects for Nepal in sustainably developing its own electric vehicle industry have been strengthened in that Nepal's closest neighbours, China and India, have made a lot of progress in the development of electric vehicles.

Electric two-wheelers are already in commercial use in some cities in China. China is working for the cleanest and greenest Olympics ever in 2008 with the use of a large number of electric vehicles in Beijing. A wide variety of electric vehicles ranging from electric scooters, cars and vans to high-capacity electric buses and hybrid buses are being manufactured in China. Tinajin Qinyuan Electric Vehicle Company has developed a 5-door mini-car called the *Happy Messenger* that looks just like any gasoline car fit for city driving. Bus companies such as the Shanghai Sunwin Bus Corporation are manufacturing battery-operated electric buses and trolley buses.

In India, alongside REVA, Scooters India Ltd has developed several models of electric three-wheelers. Bajaj Auto Ltd is about to commercialize the electric version, 'Eco-

“ the government has reduced the customs duty on electric vehicle chassis imports by half ”

fleet of electric vehicles for public transportation in terms of the ratio of electric to fossil fuelled vehicles. Four new Safa Tempos with enhanced features are currently being manufactured to meet the tourism industry's need for clean transportation.

With the demand for electric vehicles obviously growing as an alternative to fossil fuel driven vehicles, the private sector's interest in manufacturing second-generation electric vehicles with an alternating current drive system and four wheels, instead of three, is also expanding.

Hulas Motors will soon enter into commercial production with the vehicle, running under the name of Mini EV. The four-wheeled vehicle will be a five to ten passenger van that can be used for private as well as public transportation.

The vehicle is based on an 84 volt system and uses fourteen pieces of six volt lead acid batteries. It uses an alternating current drive system and has the added features of on-board charging, regenerative braking and a multi-gear system, amongst other facilities. It is competitively priced alongside the

Rick', of its popular three-wheelers. Bigger companies like TATA and Ashok Leyland are working to manufacture trolley buses and other electric vehicles. BHEL, a public sector company, has made electric buses.

Most electric vehicles in Nepal use lead acid deep cycle batteries to power the motors. The most popularly used battery is the Trojan 125 which is manufactured in the United States. The Nepalese electric vehicle industry has found Trojan batteries to be consistent and reliable in performance. A local battery manufacturer also manufactures lead acid batteries. Even though the company manufactures both flat and cylindrical plate batteries, these have not found popularity due to their relatively poor performance.

According to a survey conducted by the Kathmandu Electric Vehicle Alliance, the average life of Trojan 125 batteries, used by the Safa Tempos, was found to be 20 months or 550 deep cycles. Most batteries are watered with de-ionized water rather than distilled water. Three different brands of de-ionized water with electrical conductivities ranging from 0.2 to 1.3 are being used.

More than 35 battery charging stations have been established in Kathmandu to cater to the battery charging needs of Safa Tempos. On average, each charging station has 22 battery chargers. There is a mix of manual and automatic chargers in most of these charging stations. All of these chargers are manufactured locally by different companies and all chargers follow a constant current, constant

voltage and constant current charging profile. The charging starts with 22 amperes and ends with two to three amperes. The battery voltage rises from 72 to 90 volts during this time. On an average, 15kWh of energy is consumed in this process. It takes 10 to 12 hours for one set of batteries to get fully charged.

In order to further promote the use of electric vehicles in Nepal, the government has reduced the customs duty on electric vehicle chassis imports by half. The excise duty for electric vehicles has also been waived. Very minimal custom duties in the order of one to five per cent have been applied for major electric vehicle accessories such as motors, controllers, batteries and so on. The batteries used for electric vehicles have also been exempted from Value Added Tax.

All these government incentives have encouraged private sector investment. These steps have established a secure and encouraging environment for foreign investors wanting to manufacture electric vehicles as a means to export to the huge markets in India and China. As a result, Nepal is witnessing a boom in the development and use of electric vehicles and there is no doubt that many more electric vehicles will be added to the fleet in coming years. ■

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FURTHER INFORMATION

● **In the Cyberlibrary:** The Tiempo Climate Cyberlibrary presents a listing of theme sites on mountains and climate change at www.tiempocyberclimate.org/portal/t4445web.htm

● **On the Web:** A copy of the report *Promoting Electric Vehicles in Tourism Industry* can be downloaded from the Kathmandu Electric Vehicle Alliance website at www.keva.org.np. This website contains a wealth of information about electric transport in Nepal.

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ENERGY SAVINGS

A report on the 3 Country Energy Efficiency Project concludes that China, India and Brazil will more than double their greenhouse gas emissions within a generation if energy efficiency efforts are not successful.

In contrast, "improving energy efficiency for existing buildings and other infrastructure could cut current energy consumption by 25 per cent or more in India, China and Brazil, amounting to millions of tons in reduced greenhouse gas emissions and hundreds of millions of dollars in energy savings," according to Robert Taylor, project leader.

Read more:
www.tiempocyberclimate.org/newswatch/index.htm#060611

GREEN ENERGY

More than 200 green energy projects have been approved under the Clean Development Mechanism since late 2004, and 600 more are in the pipeline, according to the Climate Change Secretariat.

There is concern, though, about the lopsided development of the programme. "Whilst the mechanism is seeing exponential growth, the growth is still too unevenly distributed," according to Richard Kinley, Secretariat head. There have been few projects in Africa, for example. To date, the Netherlands, Britain and Japan have been the leading investors.

Read more:
www.tiempocyberclimate.org/newswatch/index.htm#060625

DESERTIFICATION

A United Nations conference, held in Tunis, Algeria, during June 2006, has concluded that better management and a wider spreading of scientific knowledge are essential in the fight against desertification.

The Tunis Declaration calls on governments to "place combatting desertification and development of drylands as a major priority and to create an enabling environment."

Read more:
www.tiempocyberclimate.org/newswatch/index.htm#060702

AFRICA

Poverty in Africa can be made history if the continent's resources are harnessed effectively, fairly and sustainably, a recent report argues.

According to Africa Environment Outlook-2, a report from the United Nations Environment Programme (UNEP), the region is only realizing a fraction of its nature-based economic potential, from freshwater to forests and from minerals to the marine environment. Speaking for UNEP, Executive Director Adam Steiner said that "the report challenges the myth that Africa is poor".

Read more:
www.tiempocyberclimate.org/newswatch/index.htm#060709

AIR TRAVEL

The European Parliament is supporting proposals for an emissions trading scheme for air travel.

Despite the air industry's substantial contribution to global warming, the Kyoto Protocol exempted the sector from emissions reductions targets in the expectation, that has not been realised, that a voluntary scheme would be established. It is hoped that the European initiative will curb the growth in emissions from the region's aircraft, which stood at 85% between 1994 and 2004

Read more:
www.tiempocyberclimate.org/newswatch/index.htm#060716

Clean development in Nepal

Noora Singh discusses the future of the Clean Development Mechanism in Nepal

The first couple of projects from the small Himalayan nation of Nepal have now been registered by the Executive Board of the Clean Development Mechanism. Nepal is one among the group of developing Non-Annex I countries that can host projects for the Clean Development Mechanism.

The Kyoto Protocol, adopted during the Third Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) in December 1997, set quantifiable emission reduction targets for developed countries included in Annex I of the Framework Convention.

In order for countries to achieve their targets where it is most economical to do so, the Protocol developed flexible mechanisms. Besides emissions trading and Joint Implementation, the Clean Development Mechanism is the only flexible mechanism that involves

developing countries. It has been developed as a unique mechanism for increasing financial flows to developing countries for promoting clean technologies that not only reduce greenhouse gas emissions but also contribute towards the sustainable development of the country.

With the entry into force of the Kyoto Protocol in February 2005, the Clean Development Mechanism and the carbon market as a

MAIN POINTS

- **The author describes** the history of the Clean Development Mechanism in Nepal.
- **Small-scale** biogas projects represent the first Clean Development Mechanism activities in Nepal.
- **Great potential** lies in other small-scale projects, mostly aimed at delivering renewable energy services to rural households, which could actually meet the development objectives of the Mechanism.

whole has seen a lot of activity. The first Certified Emission Reductions has recently been issued and a total of 63 Clean Development Mechanism projects has been registered by the Executive Board. Nepal has recently deposited the instrument for accession to the Kyoto Protocol and has thus fulfilled the first requirement for participation in the Clean Development Mechanism.

The next participation requirement is the establishment of a national authority known as the Designated National Authority. The Designated National Authority is entrusted with the task of approving Clean Development Mechanism projects on the basis of their contribution to sustainable development of a country. The Authority thus plays an important role by evaluating projects so that they fulfil one of the two major objectives of the Clean Development Mechanism.

Most of the countries in Latin America and Asia have already established their Designated

nated National Authorities and a number of them have now had experience in evaluating and approving Clean Development Mechanism projects. Nepal has recently established its Designated National Authority under the Ministry of Environment, Science and Technology and has thus fulfilled this stage of the requirement.

The Promotion of Renewable Energy, Energy Efficiency and Greenhouse Gas Abatement (PREGA) project is funded by the Netherlands Government, and implemented by the Asian Development Bank. The PREGA project, underway in Nepal and 15 other countries in Asia, aims to increase investments in renewable energy technologies through the Clean Development Mechanism, among other things.

In Nepal, this project has been instrumental in furthering the Clean Development Mechanism process through capacity building as well as project development and assistance. The project has the Ministry of Environment, Science and Technology as the National Counterpart Agency and Winrock International, Nepal working as the National Technical Expert.

This article discusses the opportunities and constraints for Nepal for participation in the Clean Development Mechanism, mostly in light of the PREGA Project.

According to the National Greenhouse Gas Inventory Study of Nepal, the net emissions of carbon dioxide, methane and nitrous oxide were 9,747Gg, 877Gg and 30Gg, respectively,

for the base year 1994/95. Greenhouse gas emissions from the country are negligible in comparison to other countries in the world and in the region as well.

The land use change and forestry sector is the largest emitter of carbon dioxide with emissions of 22,895Gg but is also the sector that allows carbon sequestration to the amount of 14,778Gg. The energy sector is the second largest emitter of carbon dioxide with 1,465Gg and the transportation sector contributes the largest percentage here. Methane emissions from the agriculture sector through enteric fermentation and rice cultivation as well as solid waste management are also important sources in the country.

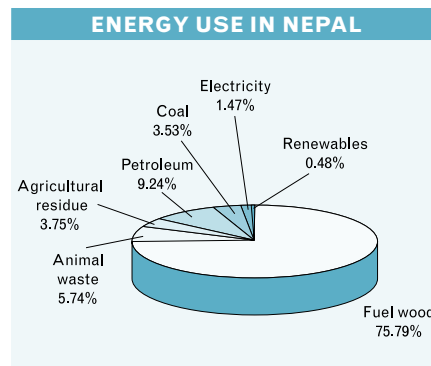
Clean Development Mechanism potential in the energy sector

Historically, traditional sources of energy like fuelwood, animal waste and agricultural

residue have been used to meet energy requirements in Nepal. The scenario in recent times has not changed much, although modern forms of energy are increasingly being used. As illustrated in the figure on this page, 86 per cent of the total energy consumption in Nepal in 2002 was supplied by biomass sources. The large share of fuelwood in the energy mix suggests that this consumption is unsustainable and is exerting pressure on the already depleted forest resources of the country.

Electricity consumption accounted for a mere 1.47 per cent in 2002, indicative of the fact that access to electricity is still restricted to the more urban areas of the country. The rural population is largely detached from the grid and, even in areas served by the national grid, a large number of people cannot afford a grid connection. Electricity generation in the country is mainly from clean hydropower. However, a large proportion of the country's hydropower resources remain untapped. Coupled with the rugged terrain of the country, grid expansion is expensive and difficult.

Access to energy is considered to play a vital role in poverty reduction. A growing volume of literature in recent times has voiced the need for integrating energy in efforts to achieve the Millennium Development Goals. In the context of Nepal, a clear connection can be seen between energy, the Millennium Development Goals and the Clean Development Mechanism.



The share of renewables shown in the figure on page 13 is a mere 0.48 per cent. This opens the door for a mechanism such as the Clean Development Mechanism to fill the financing gap for promotion of renewable forms of energy. Off-grid and distributed forms of energy like solar, biogas and micro-hydro can not only increase rural access to energy but also reduce the share of fossil fuel and traditional fuel consumption in the country. The residential sector consumes the most energy in Nepal supplied by a mix of biomass, electricity and kerosene. The Clean Development Mechanism thus has a clear role in promoting clean energy for domestic end-uses like cooking and lighting. Renewable energy and energy efficiency projects directed at such household levels will also help reduce poverty and help achieve the Millennium Development Goals by increasing income-generating activities, education, gender equality, environmental quality and health in rural Nepal.

The industrial and commercial sectors are not very vibrant in the country and do not consume much energy (5.25 per cent and 1.33 per cent, respectively, in 2002). The fuel mix of these sectors shows a combination of biomass and fossil fuels. The Clean Development Mechanism has some potential in these sectors for fuel switching or energy efficiency. The transportation sector is largely dependent on fossil fuels and imported fuels at that. The Clean Development Mechanism could benefit this sector through fuel switching or

through promotion of electric vehicles that utilize the hydroelectricity generated within the country.

Clean Development Mechanism potential in methane emissions avoidance

The agricultural and waste management sectors contribute to methane emissions with rice cultivation and enteric fermentation in the agriculture sector contributing the greatest share. Improved water management practices and improved livestock feed management can contribute to reduction in emissions from these activities and can be developed as Clean Development Mechanism projects as well as better livestock manure management practices. The Clean Development Mechanism pipeline in the agriculture sector is dominated by manure management and methane recovery projects. New methodologies will have to be developed for improved water management and feed management projects.

Proper management of solid waste has been a challenge in urban areas. Most municipalities practice dumping along river banks thereby affecting river water quality. A couple of landfill sites are operational in the country and new ones are continually being planned. Landfill gas, the primary source of methane emissions, is not regulated by any legislation in the country. One of the most popular project activities under the Clean Development Mechanism is landfill

gas management. There is thus some potential for Nepal to benefit from financing in the waste management sector. The large up-front investment requirements and the lack of technological know-how locally pose barriers for such project activities which is where the Clean Development Mechanism could contribute by generating an extra stream of revenue for the projects.

Clean Development Mechanism potential in the land use, land use change and forestry sector

Project activities in the land use, land use change and forestry sector that are eligible in the first commitment period are restricted to afforestation and reforestation activities. This, however, has been a contested ground within the Clean Development Mechanism due to issues such as scientific uncertainty, appropriate methodology and non-permanence. The first afforestation and reforestation methodology has recently been approved by the Clean Development Mechanism Executive Board. The National Greenhouse Gas Inventory Study of Nepal reveals that a large amount of carbon dioxide can be absorbed by biomass in the country. Afforestation and reforestation projects could have some potential in the country once methodological hurdles have been crossed.

Clean Development Mechanism project development in Nepal

Biogas projects are the first Clean Develop-

ment Mechanism projects in Nepal. They are small-scale projects that involve building of a number of biogas plants in the country. Carbon revenue through these projects will be utilized by the sector to make biogas a commercial activity in the country that can sustain itself in the face of declining subsidies and donor support. The biogas project is a good example of a project that delivers a number of benefits to rural households while reducing greenhouse gas emissions.

Biogas displaces fossil fuels and firewood utilized for cooking and lighting purposes in rural households and provides a clean source of energy using local resources that creates better living conditions for rural people. Biogas installation in a rural household also reduces the drudgery of women and children associated with firewood collection. Children will, therefore, have more time to concentrate on school work. Increased savings through avoided purchases of fossil fuels could also be utilized in generating alternative livelihoods.

The PREGA Project in Nepal is developing project idea notes, project design documents and pre-feasibility studies for a number of potential Clean Development Mechanism project activities in the country. As noted earlier, the PREGA Project has been instrumental not only in project development but also in other important related activities such as capacity building and providing support, through research and public consultation, for the establishment of the Designated

National Authority in Nepal. A number of training workshops were conducted for creating awareness of the Clean Development Mechanism in important sectors such as the business community, non-governmental organizations and financial and governmental institutions. A Carbon Fair was also organized as part of the project to allow project developers in the country to interact with buyers and project validators to better understand the Clean Development Mechanism process.

The Alternative Energy Promotion Centre, under the Ministry of Environment, Science and Technology, is the principal government organization involved in promoting renewable sources of energy and energy technologies in the country. The Centre is project developer of the biogas project described earlier. The Alternative Energy Promotion Centre is currently developing a couple of Clean Development Mechanism projects involving the installation of micro-hydropower plants and improved water mills for off-grid rural communities. The micro-hydro project is being developed with the assistance of the Community Development Carbon Fund of the World Bank and Winrock International. The improved water mills project is being developed in cooperation with the Center for Rural Technology, Nepal.

The Nepal Electricity Authority, a government agency responsible for electricity generation and distribution in the country, is looking to develop hydropower projects in



Women carrying firewood for cooking in rural Nepal

Photo: © Winrock International, Nepal

the country that can displace electricity imports from neighbouring India or displace thermal electricity generation within the country.

A list of Clean Development Mechanism projects in Nepal and their estimated amount of emission reductions is provided in the table on page 17. Additional projects are being developed under the PREGA Project.

Challenges for Nepal

Nepal, with a Human Development Index of 0.499, ranks 143rd in the world. With a population growth rate of approximately two per cent and with 38 per cent of the population below the poverty line, it is one of the Least Developed Countries in the world.

Greenhouse gas emissions in Nepal are negligible. Recognizing the global challenge and its own vulnerability to climate change, however, Nepal has become a party to the climate treaty and the Kyoto Protocol. The Clean Development Mechanism, in theory, is perceived as a mechanism that delivers positive sustainable development effects to developing countries such as Nepal while also reducing greenhouse gas emissions. Economic development is a pressing need for Nepal and in such a context, the Clean Development Mechanism does provide an

incentive for a cleaner and more sustainable path to development. The challenges, risks and uncertainties of the Mechanism should not, however, be ignored.

tiveness translates to developing a healthy pipeline of Clean Development Mechanism projects in the country. This, though, necessitates a number of requirements. Awareness of the Mechanism is needed in all sectors for project development. Nepal is yet to develop a comprehensive climate policy and the Clean Development Mechanism is a novel concept that changes continuously. Apart from the PREGA Project, the country has not been the focus for capacity development projects of international development organizations. The Designated National Authority has only recently been established and is not yet in a position to play a promotional role. In fact, the Designated National Authority itself is in need of further assistance and capacity development in order to perform its basic function, that of evaluating and approving Clean Development Mechanism projects.

in the country and most Clean Development Mechanism projects involve new and emerging technologies and procedures that add to the investment risk.

In the absence of foreign investment, financial institutions in the country lack a full comprehension of the Mechanism which makes them hesitant to provide debt financing for projects. Carbon credit buyers, attracted to countries like Brazil and India that are currently supplying the majority of credits in the market, are looking for projects that can deliver credits within the first commitment period. The uncertainty of the value of Certified Emission Reductions beyond 2012 has also been a deterrent for buyers purchasing credits beyond this time. The window of opportunity for Nepal, before which time it needs to develop projects that can benefit from carbon trading, is, therefore, small. The country faces a huge challenge in terms of developing enough capacity for a smooth project development process that can secure carbon financing.

The Clean Development Mechanism Executive Board, in a recent decision, has excluded the eligibility of projects that avoid unsustainable biomass consumption. Traditional fuel consumption in the form of firewood and deforestation is a problem in most developing countries including Nepal. Projects like biogas and improved cooking stoves in Nepal that displace firewood consumption in rural areas will be excluded as a result of this decision. This poses a further challenge

“the challenges, risks and uncertainties of the Clean Development Mechanism should not be ignored”

incentive for a cleaner and more sustainable path to development. The challenges, risks and uncertainties of the Mechanism should not, however, be ignored.

The Clean Development Mechanism has been developed as a market mechanism. The foremost challenge for a small Least Developed Country like Nepal is to be able to compete in this market. Increasing competi-

tion for a cleaner and more sustainable path to development. The challenges, risks and uncertainties of the Mechanism should not, however, be ignored.

Securing finance for Clean Development Mechanism projects has been a major hurdle for most developing countries. Projects are mostly developed unilaterally and carbon credit buyers are rarely willing to provide up-front finances and when they do the Certified Emission Reductions purchase is set at a lower price. The political and economic situation of Nepal poses an increased risk for investment

| CLEAN DEVELOPMENT PROJECTS IN NEPAL | | | | |
|--|---|---|--------------------------|---|
| Name of project | Project developer | Emission reduction (tCO ₂ e) | Crediting period (years) | Project status |
| Biogas Support Program, Nepal Activity 1 | Alternative Energy Promotion Center | 328,900 | 7 | Registered |
| Biogas Support Program, Nepal Activity 2 | Alternative Energy Promotion Center | 328,250 | 7 | Registered |
| Micro-Hydro Project, Nepal | Alternative Energy Promotion Center | 344,930 | 10 | Project Design Document (PDD) being revised |
| Sisdol Landfill Gas to Energy Project | Kathmandu Metropolitan City | 300,101 | 21 | PDD being revised |
| Improved Water Mills Project, Nepal | Center for Rural Technology, Nepal | 137,383 | 20 | Project Idea Note (PIN) prepared |
| Improved Cooking Stove Program, Nepal | Center for Rural Technology, Nepal | 1,187,549 | 10 | PIN |
| Light for All Project, Nepal | Center for Renewable Energy | 81,794 | 10 | PIN |
| Vertical Shaft Brick Kiln, (VSBK) Program, Nepal | VSBK Program, Nepal | 1,715,635 | 14 | PIN |
| Kathmandu Safa Tempo (Electric Three Wheeler) Project | Electric Vehicle Association of Nepal | 122,083 | 14 | PIN |
| Trolley Bus Development in Ring Road of Kathmandu Valley | | 128,927 | 21 | Pre-feasibility |
| Hydropower for export | West Seti Hydroelectric Corporation Ltd | 48,213,105 | 21 | Pre-feasibility |
| Development of an East-West Electric Railway in Nepal | | 9,421,283 | 21 | Pre-feasibility |
| Hewa Khola Hydroelectric Project | Nepal Electricity Authority | 1,974,718 | 25 | PIN |

for Nepal where the majority of energy supply is from firewood. The Clean Development Mechanism could have provided a platform to leapfrog from traditional to clean energy

avoiding the need for fossil fuels.

International efforts are ongoing for new methodologies that address the displacement of non-renewable biomass and to in-

clude efforts that avoid deforestation. Carbon removal through biomass growth has been seen as an important player in net greenhouse gas emissions in Nepal. Inclusion



A Solar Tuki Set to be sold to households to displace kerosene-based lamps

Photo: © Winrock International, Nepal

of projects that avoid deforestation through conservation of existing forests would provide a potential Clean Development Mechanism sector for Nepal. The course of international events related to these topics will be very important for the nation.

The issue of whether the Clean Development Mechanism is delivering real sustainable development benefits to host countries has been a matter of much discussion in the international arena. As has been noted, the current trend of projects and the interest of buyers lie in large projects that can generate a large volume of Certified Emission Reductions in a short period of time. Most current projects concentrate on industrial processes

and mitigating industrial gases with high global warming potentials.

Projects from Nepal are mostly small-scale, aiming to deliver distributed renewable energy services to rural households. Projects like the biogas project, light-for-all project, improved cooking stoves, micro-hydropower project and improved water mills project are the ones that can contribute to reducing poverty, improving rural livelihoods, health and education. These are projects at the grassroots level and are ones that will significantly contribute to the sustainable development of the country.

In the race to meet their Kyoto Protocol targets, the developed world's nations need to readjust their focus and look at smaller developing countries that have the very real potential to supply projects that actually meet the objectives of the Clean Development Mechanism. ■

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FURTHER INFORMATION

● **In the Cyberlibrary:** The Tiempo Climate Cyberlibrary presents a listing of theme sites on the Clean Development Mechanism at www.tiempocyberclimate.org/portal/t53web.htm and on mountains and climate change at www.tiempocyberclimate.org/portal/t4445web.htm

● **On the Web:** Nepal's Initial National Communication under the UNFCCC is available as a 2.8Mb download at <http://unfccc.int/resource/docs/natc/nepnc1.pdf> A comprehensive listing of Clean Development Mechanism activities, including current status, is available at <http://cdm.unfccc.int/Projects/registered.html>

DISCLAIMER

The views expressed in this article are those of the author and do not explicitly represent those of the author's affiliated organization.

CONFERENCES

Monitoring of Mediterranean Coastal Areas: Problems & Measurement Techniques

Sardinia, Italy

04-10-2006 to 06-10-2006

Organized by CNR-IBIMET, the Institute for Biometeorology with other institutes. Main symposium session topics are: evolution of coastlines and coastal erosion; coastal vegetation; sea beds, plant cover and water quality; coastal and submarine archaeology; coastal fires and environmental recovery; and coastal anthropization and socio-economic exploitation of the territory.

Details: Organizing Secretariat, CNR-IBIMET sede di Sassari, Via Funtana di Lu Colbu 4/a, 07100 Sassari, Italy. Fax: +39-79-268248. Email: segr.org@ss.ibimet.cnr.it

On the Web: server.ss.ibimet.cnr.it/ita/simposio.htm

Adaptation to the Impacts of Climatic Change on the European Alps

Wengen, Switzerland

04-10-2006 to 06-10-2006

Workshop is the twelfth in an annual series on Global Change Research. Will draw together experts from countries within the Alpine Arc to examine the vulnerability of particular sectors and systems to climate change impacts. Also will assess progress on the formulation and implementation of adaptation responses at various levels.

Details: Martin Beniston, Department

of Geosciences, University of Fribourg, Chemin du Musee 4, CH-1700 Fribourg, Switzerland. Fax: +41-26-3009746.

Email: martin.beniston@unifr.ch

On the Web: www.unifr.ch/geosciences/geographie/EVENTS/Wengen?06/Wengen2006.html

Energy, Climate & Future Welfare – Changing Global Dynamics

Lubeck, Germany

08-10-2006 to 10-10-2006

Organized by the Dräger Foundation with the Kiel Institute of World Economics. A panel will focus on discussing the issue of whether we are running out of gas. Working groups will then discuss: future energy systems; energy policies - implications for global climate and future wealth; technical challenges and options for future energy supply; and, the north-south conflict - energy consumption and sustainable development.

Details: Symposium Organizer, Dräger-Stiftung, Moislinger Allee 53-55, D-23558 Lubeck, Germany. Fax: +49-451-8823050. Email:

draeger-stiftung@draeger.com

On the Web: www.draeger-stiftung.de

2nd International Conference on JI Projects in the Ukraine: Climate Change & Business

Kiev, Ukraine

23-10-2006 to 25-10-2006

Participants will include managers of Ukrainian companies, foreign investors, scientists, government officials, and representatives from non-

government organizations and the public. Conference topics include: investors' outlook into the Joint Implementation (JI) market; emissions trading and related procedures in the Ukraine; JI projects in all related sectors; and, the development, validation and verification of JI projects.

Details: Alexandra Pukhnyuk, Scientific Engineering Centre, PO Box 66, 03067 Kiev, Ukraine. Fax: +38-44-4532856.

Email: jiconference@biomass.kiev.ua

On the Web: www.biomass.kiev.ua/JI-conf2006

Rapid Climate Change International Science Conference

Birmingham, UK

24-10-2006 to 27-10-2006

Intended that the conference explore the scientific understanding of rapid climate change, with a main but not exclusive focus on the role of the Atlantic Ocean's thermohaline circulation in such change. Will bring together international community of scientists carrying out oceanographic observations, paleo studies and ocean and coupled climate modelling in order to discuss recent research findings and identify problems and ways forward.

Details: Andy Parsons, Natural Environment Research Council, Polaris House, North Star Avenue, Swindon SN2 1EU, UK. Fax: +44-1793-411545.

Email: andy.parsons@nerc.ac.uk

On the Web: www.rapid.nerc.ac.uk/rapid2006/

6th International Workshop on Large-Scale Integration of Wind Power & Transmission Networks for Offshore Wind Farms

Delft, The Netherlands

26-10-2006 to 28-10-2006

Coorganized by the TU Delft, Energnautics GmbH in the Netherlands and the Royal Institute of Technology in Sweden. Event will include a field trip to the Offshore Wind Park at Egmond aan Zee. Topics will cover experiences and advances made in the large-scale integration of wind power and the technology and management of these systems.

Details: Thomas Ackermann, Royal Institute of Technology, School of Electrical Engineering, Teknikringen 33, 10044 Stockholm, Sweden. Fax: +46-8-7906510. Email: thomas.ackermann@ieee.org or info@offshoreworkshop.org

On the Web: www.offshoreworkshop.org

CASA ENERGIA EXPO 2006

Milan, Italy

27-10-2006 to 29-10-2006

The exhibition, dedicated to residential buildings that produce and save energy, will be held at the Forum Asago Fair Centre. The event will focus on the entire building, energy and interior residential sectors with best solutions presented, for energy saving for the domestic sector, by specialized developers. Areas will include: photovoltaics, solar thermal; high-efficiency heating and air conditioning;

CONFERENCES

energy saving and efficiency, and water saving.

Details: Artenergy srl, Via Gramsci 57, 20032 Cormano, Milan, Italy. Fax: +39-2-66305510. Email: press@artenergy.it On the Web: www.casaenergia.com

12th Conference of the Parties to the UNFCCC & 2nd Meeting of the Parties to the Kyoto Protocol

Nairobi, Kenya

06-11-2006 to 17-11-2006

Will continue the annual process of dialogue and debate over the commitments made and failures to meet targets within the UNFCCC process. Clean Development Mechanism (CDM) measures and Certified Emission Reductions (CERs) are likely to be major issues on the agenda.

Details: COP12, UNFCCC Secretariat, PO Box 260 124, D-53153 Bonn, Germany. Fax: +49-228-8151999. Email: info@unfccc.int

On the Web: www.unfccc.int

Global Environmental Change: Regional Challenges

Beijing, China

09-11-2006 to 12-11-2006

Conference is being organized by the Earth System Science Partnership (ESSP) which is a collaboration between DIVERSITAS, IGBP, IHDP and the WCRP. Intent of the 2006 conference is to present progress in understanding of the systems of global environmental change and to highlight the ESSP approach to the study of the Earth System. Will also dis-

cuss integrated regional studies, global change in monsoon asia, and science for sustainability.

Details: 2006 Conference Organizer, Institute of Botany, University of Basel, Schonbeinstr 6, 4056 Basel, Switzerland. Fax: +41-61-2673504. Email: gmba@unibas.ch

On the Web: www.essp.org/essp/ESSP2006j

LAREF 2006 & RIO 6

Rio de Janeiro, Brazil

17-11-2006 to 18-11-2006

The Latin America Renewable Energy Fair (LAREF 2006) will be held in conjunction with the international Rio 6 Congress following on from past World Climate and Energy Events. Will provide companies and institutions the opportunity to present their latest innovations in renewable energy technologies and services. Focus will be on global strategies to boost the application of renewable energies for climate protection and sustainable energy supply.

Details: RIO 6 - LAREF Organization Office, a/c PML Ave Rio Branco, 25-18 andar, 20093-900 Rio de Janeiro, Brazil. Fax: +55-21-22115026. Email: info@rio6.com

On the Web: www.rio6.com

Sustainable Consumption & Production: Opportunities & Challenges

Wuppertal, Germany

23-11-2006 to 25-11-2006

SCORE - Sustainable Consumption Research Exchanges - is an EU-funded network project supporting the UN's 10 Year Framework of Programmes on Sustainable Consumption and Production. Aim of SCORE is to organize a leading science network to provide input to this framework and consists of 28 institutions. Conference will mark the official launch of the SCORE Network, provide an opportunity for input of case studies, and build a broad platform for presenting future work.

Details: Arnold Tukker, SCORE-TNO, PO Box 49, 2600 AA Delft, The Netherlands. Fax: +31-15-2695460. Email: arnold.tukker@tno.nl

On the Web: www.score-network.org

Death by a Thousand Coasts: The Ethics of Climate Change

Washington DC, USA

24-11-2006 to 27-11-2006

Sponsored by the Inter-Research Science Center. Technical session themes include: earth systems and climate change; climate change and human history; ecology and biodiversity; economics and climate change; political responses to climate change; and, coastal disaster response, risk assessment and reconstruction. Keynote speakers will focus on climate change and the fate of civilizations, climate change and biodiversity, and the economic challenges of climate change.

Details: Ethics Symposium Organizer, Eco-Ethics International Union, Nord-

bueente 28, 21385 Oldendorf|Luhe, Germany. Fax: +49-41328883. Email:

eeiu@eeiu.org

On the Web: www.eei.org

International Dialogue on Science & Practice in Sustainable Development

Chiang Mai, Thailand

23-01-2007 to 27-01-2007

Subtheme of the conference is "Linking Knowledge with Action". Aims to foster effective collaborations between scientists and practitioners to advance the practice of sustainable development, through knowledge sharing and promoting national, regional and international actions and implementation.

Details: Jill Jaeger, IDSP Executive Director, c/o Sustainable Europe Research Institute, Garnisonsgasse 7|27, A-1090 Vienna, Austria. Fax: +43-1-2632104. Email: jill.jaeger@seri.at On the Web: www.sustdialogue.org

2007 European Renewable Energy Policy Conference

Brussels, Belgium

29-01-2007 to 31-01-2007

Aims to present and evaluate the most important renewable energy policy developments and bring forward new initiatives as well as facilitating networking.

Details: Kathrin Braun, European Renewable Energy Council, Renewable Energy House, Rue d'Arlon 63-65, B-1040 Brussels, Belgium.

Designing adaptation projects

Mozaharul Alam and Lwandle Mqadi describe a novel way of identifying, designing, implementing and monitoring community-based adaptation projects

It is well known that climate change impacts will be greater, both spatially and socio-economically, in poor and disadvantaged communities, especially in the Least Developed Countries. Helping poor and vulnerable communities is always a challenge, and incorporating future climate change risks into development projects poses an additional challenge. Appropriate sustainable community-based strategies and activities are needed to do this effectively.

The Adaptation Programme of the South-SouthNorth (SSN) Project has developed a learning by doing approach for identifying, designing, implementing and monitoring community-based adaptation activities. This approach is known as the SouthSouthNorth Adaptation Project Protocol (SSNAPP). SSNAPP is grouped into four phases: the identification phase, design phase, implementation phase, and monitoring and evaluation phase.

The identification phase

The identification phase involves both 'top-down' and 'bottom-up' activities. These include:

- mapping physical vulnerabilities to climate change and climate variability of both regions/areas and also sectors. This is done using existing documentation

MAIN POINTS

• **The authors describe** how to identify, design, implement and monitor community-based adaptation projects.

• **They use** a combination of top-down and bottom-up approaches to identify national poverty/climate hot spots. They stress the importance

of responding to local circumstances and working closely with local communities and institutional structures.

• **They conclude** with a list of community-based adaptation projects conducted under the SouthSouthNorth Project.

available at national, regional and global scales such as National Communications, regional climate change scenarios, and reports from the United Nations Framework Convention on Climate Change and Intergovernmental Panel on Climate Change; and,

- poverty mapping at national, sub-national and local levels using existing country-level documentation and data on poverty, national development studies, Poverty Reduction Strategy Papers and information from household expenditure and income distribution surveys.

Information from these two top-down activities is then combined by overlaying maps of physical vulnerabilities and poverty distribution. This locates national 'hot spots' of climate change/climate variability and poverty.

Bottom-up activities follow the identification of these national poverty/climate hot



Flooding in Bangladesh

Photo: John Soussan

spots. Reconnaissance and verification surveys are conducted at the hot spots in order to:

- gather information on who is doing what and who knows what. This includes identifying community-based institutions, institutions undertaking development in the area, and other institutional structures and processes;
- find out what information is available on local climate variability/climate change, disaster management activities, current adaptation to climate change activities and other development activities; and,
- validate and crosscheck findings from the top-down analysis with the community and local institutional structures.

Information from these bottom-up activities informs the process whereby a range of potential community-based adaptation to climate change project activities are conceptualized. During this process potential community-based institutions are identified as partners for the identification, design and implementation phases. Identification of these partners is based on their willingness to be involved with the process, whether they have a credible relationship with the

community and local funding agencies, and their capacity to raise funds and build partnerships.

The design phase

Partnership building and fundraising takes centre stage during this phase. Activities include:

- building stronger and closer relationships between all relevant stakeholders, especially the vulnerable communities. This includes the formation of Project Design Teams, which include vulnerable communities, community structures and institutions, technical intermediaries, government institutions and other relevant stakeholders;
- capacity building activities for all relevant stakeholders on issues such as climate change, climate variability, vulnerability and climate risks, disaster management and mitigation;
- understanding the risks and vulnerabilities faced by, and from the perspective of, vulnerable communities. This includes understanding existing institutional structures and development institutions; and,
- interacting with potential funders, at local, national and international levels, who could fund implementation activities.

The design phase begins with the signing of a memorandum of understanding with the selected partner institution. Developing a full Project Design Document for target communities is another key step in this phase.

COMMUNITY-BASED ADAPTATION PROJECTS

| | |
|--------------|--|
| Bangladesh | Enhancing the adaptive capacity of a community vulnerable to drought in the northwest region of Bangladesh |
| | Enhancing the adaptive capacity of a floodplain community in south central Bangladesh to reduce their vulnerability to prolonged floods and water logging |
| | Community adaptation to saline water intrusion and cyclones in a southwest coastal region of Bangladesh |
| Brazil | Improving agricultural productivity and income generation through the use of photovoltaic water pumping in Pintadas: an initiative led by women, which addresses the key sustainability and feasibility components of a small-scale adaptation project in a semi-arid environment |
| | Wastewater recycling for communities and institutions: improving soil fertility, biodiversity, water conservation, disease prevention, income generation and environmental education |
| | Ecological recuperation of the Suruí River Basin to prevent native forest and mangrove deforestation, erosion and overfishing, to discourage occupation of river margins, chemical intensive agricultural activities (and the pollution that follows), to increase family income and to promote local culture and global citizenship |
| Indonesia | Management of a water catchment area to promote conservation of degraded land in central Java |
| | Adaptation to coral bleaching events resulting from climate change by increasing coral reef resilience in west Waigeo district |
| | Coastal community adaptation to the impacts of sea level rise by conserving mangroves in Ayau district |
| Mozambique | Water pumping in dry areas of the country to adapt to climate change impacts |
| | Food security and agricultural activities in dry areas of the country to adapt to climate change impacts |
| Tanzania | Aforestation and conservation activities in the Mount Kilimanjaro area to adapt to climate change impacts |
| | Freshwater conservation and water harvesting activities in coastal areas to address rising salinity resulting from climate change |
| South Africa | Supporting action research and community-led adaptation in urban households |
| | Adaptation to climate change by small-scale rooibos tea farmers in Wupperthal and the Suid Bokkeveld areas of the Western and Northern Cape |

All stakeholders compile this document. It records activities and relevant data on the partner institution; interaction with the tar-

get communities and individual households; sustainable livelihood activities that could build and enhance adaptive capacity (these

are need-based activities such as capacity building through livelihood promotion), and a technological assessment of what is

needed to cope with climate variability and change (such as building community-based institutions and enhancing institutional processes).

The implementation phase

The third phase of the SSNAPP methodology involves implementing the project activities that have been identified as supporting sustainable adaptation to climate change and that address the communities' need to cope with the adverse impacts of climate variability and change. It is important to note that sustainable livelihood activities are not homogeneous and vary from community to community, sector to sector and region to region. Different types of activities are, therefore, required to enhance the community's capacity to cope with and combat the adverse impacts of climate variability and change depending on the circumstances.

Monitoring and evaluation

Monitoring and evaluation is the last phase of the SSNAPP methodology. This assesses the changes and benefits achieved from different project activities compared to the pre-project baseline. The SSNAPP methodology proposes to use a participatory monitoring tool with flexible indicators that will vary according to the nature of the community and the type of project. A number of common indicators have been identified, such as how much training has occurred, how much livelihood options have diversified, the number

of disaster resilient houses constructed and improvements in health services during disasters.

Applying the methodology

The SSNAPP methodology is currently being applied in six countries: Bangladesh, Brazil, Indonesia, Mozambique, Tanzania and South Africa. It aims to identify, design and implement community-based adaptation project activities in partnership with community-based institutions and other relevant stakeholders. The table on page 23 shows the current list of SSNAPP community-based adaptation projects.

Combining top-down and bottom-up analysis and ensuring the participation of different stakeholders at all stages are key strengths of the SSNAPP methodology. The identification and development phases both involve capacity development, which increases levels of understanding and awareness of climate change and development issues amongst participating organizations and project partners. Developing the Project Design Document also facilitates interaction and discussion with vulnerable communities, enhances understanding of community needs and helps disseminate climate and climate change related information. Using participatory exercises to identify different activities increases the acceptability of projects by the community and reduces the risks of failed implementation. ■

ABOUT THE AUTHORS



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FURTHER INFORMATION

● **On the Web:** For more details about SouthSouthNorth project activities, visit www.southsouthnorth.org

The brakes are off

BONN CONFERENCE

The latest round of negotiations on implementation of the United Nations Framework Convention on Climate Change took place in Bonn, Germany, during May 2006. Tiempo editors Mick Kelly and Saleemul Huq report.

The Bonn meeting launched with a two-day Dialogue on the way forward post-Kyoto, following the commitment made at the last Conference of the Parties to the climate treaty.

With several hundred participants, the Dialogue considered advancing development goals in a sustainable fashion, addressing action on adaptation and realizing the full potential of technology and market-based opportunities. The co-facilitators encouraged a focus on creative thinking, open dialogue and concrete actions.

On adaptation, Tanzania and the Philippines argued that adaptation should have the same status as mitigation and expressed concern at the neglect of this issue. Tuvalu

endorsed this point and called for action on adaptation, rather than studies and pilot projects.

Following the Dialogue, talks continued on implementation of the Framework Convention, the Kyoto Protocol and the form of any subsequent, post-2012 agreement.

The Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-1) met 17-25th May. This body focuses on further measures to be taken by industrialized countries for the period after 2012 when the first commitment period of the Kyoto Protocol ends.

There was considerable discussion of the future work plan of the AWG, covering the nature of level of ambition of the next commitment period and its timescale or length. The G-77/China, through South Africa, called for "substantially stricter" commitments during the post-2012 period. The European Union put forward its proposal for 15-50 per cent reductions by 2050 and called for commitments to be clearly defined and fair. Japan called for the second commitment period to be based on sound scientific analysis, rather than solely a "political exercise".

Delegates agreed to a roadmap to set new targets beyond 2012, but with no timetable for decisions on the level of the reductions. "This [agreement] makes clear... that the outcome of this process will be a new set of quantitative caps," said Michael Zammit Cutajar, who is leading the process. "This is a new phase in the life of the Protocol." The post-2012 view will have an economic and scientific underpinning, based on the forthcoming Stern Review on the economics of climate change and the Intergovernmental Panel on Climate Change's 2007 review of climate science.

The meeting reaffirmed that the AWG would move "expeditiously" towards agreement on further commitments and that there would be no gap between the current commitment period and the following phase.

The Twenty-Fourth Sessions of the Subsidiary Body for Scientific and Technological Advice (SBSTA) and the Subsidiary Body for Implementation (SBI) continued work on implementation of the Framework Convention and the Kyoto Protocol.

A pressing consideration, with the Clean Development Mechanism (CDM) operational, was how to manage the new Adaptation

Fund. The Adaptation Fund was established to finance concrete adaptation projects and programmes in developing country Parties. It is being financed with a share of proceeds from CDM project activities and will receive funds from other sources. The share of proceeds amounts to two per cent of certified emission reductions issued for a CDM project activity.

The discussion in Bonn involved the selection of the entity to manage the fund and guidance for its use. The issue was not able to be resolved as the developed countries supported the Global Environment Facility (GEF) while the developing countries opposed the GEF as the entity to be entrusted with management of the Adaptation Fund. With regard to the guidance on eligibility and criteria, this was relatively simple as the fund would be open to all developing countries that had ratified the Kyoto Protocol and would support “concrete adaptations” as laid down in the Kyoto Protocol. As no final resolution was possible in Bonn, the agenda item has been forwarded to COP12 to be held in Nairobi, Kenya, in November 2006. The SBI has prepared a compilation document containing the various proposals for the operation of the Fund and further consultation will take place.

With regard to the Special Climate Change Fund, draft text on its operation had been carried over from a previous SBI session with matters, such as the identification of priority areas, to be resolved in Bonn. Discussion on

the financing of activities led to the definition of a two-stage process, whereby technical assistance would be followed by financial support for activities and programmes. There was, however, no agreement on text regarding this or other key matters. It is intended that final recommendations will be put to COP12 in Nairobi.

The SBSTA discussed in detail the Five-Year Programme of Work on Adaptation. The nine initial activities cover: methods and tools; data and observations; climate modelling; scenarios and downscaling; climate-related events and extreme events; socioeconomic information; adaptation planning and practices; research; technologies for adaptation; and economic diversification.

In discussion, the Alliance of Small Island States (AOSIS) and others expressed concern that the work programme added little to what was already underway, while the United States underlined the need for stock-taking. Eventually, a fundamental divergence emerged between those Parties, such as the G-77/China, who considered that they had a mandate to extend the activities covered by the initial activities and, for example, the United States who considered their mandate restricted to establishing modalities for those initial activities. Unable to resolve this disagreement, discussion fell back to defining the mandate for the next stage of the deliberations in Nairobi.

The issue of reducing emissions from deforestation from developing countries was

considered by the SBSTA, with the scope of a workshop to be held in Rome, Italy, in late August 2006 providing the focus.

Finally, parties considered the future organization of the international negotiations. There was agreement that the long work hours, evening sessions and packed agenda warranted attention, with participants expressing their concern about levels of exhaustion at the meetings. Proposals for streamlining the agenda and prioritizing issues were put forward.

Where next? Bonn, perhaps, presented a more accurate portrait of the next stage of the climate negotiations than the excitement of the Montréal session last year, dominated as it was by the First Meeting of the Parties to the Kyoto Protocol. There is a long road ahead as we move forward with next stage of implementation of the climate treaty, with procedural matters requiring detailed attention and political considerations always to the fore.

“The brakes are off and the process is moving forward,” commented Jennifer Morgan of the World Wide Fund for Nature. “However, a serious scale-up in the intensity of work is needed or the impacts of climate change will quickly overtake this process if countries are not careful.”

● **Further information:** Earth Negotiations Bulletin has published daily reports and a summary of the outcome of the meeting at www.iisd.ca/climate/sb24/

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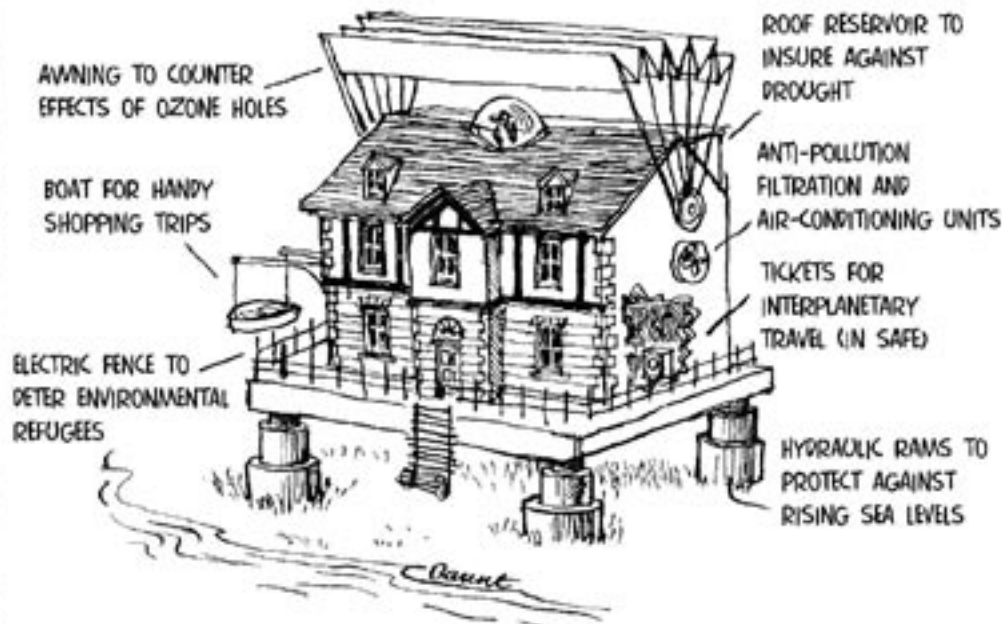
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Priorities for Nepal

Climate change is a challenge to Nepal. In a country that is already under considerable environmental stress, coupled with weak economy, lack of institutional capacity, large rural population and high dependence on natural resources, climate change will exert additional pressure on the ecological and social systems.

Steps towards mitigating climate change impacts became visible only after the second half of the 1990s even though Nepal signed the climate treaty in 1992. Preparation of the Initial National Communication was one of the very first accomplishments. Ratification of the Kyoto Protocol, establishment of the Designated National Authority and the national strategy on the Clean Development Mechanism (CDM) are some of the successful efforts towards fulfilling the international commitment. Developing national programmes, as well as including climate in national policies, is next on the agenda.

The Alternative Energy Promotion Centre is promoting clean technologies such as biogas, micro-hydro and solar. Climate Change Network Nepal is working on awareness generation and capacity strengthening. The PREGA project has been instrumental in furthering the CDM. The CDM represents

THE FINAL WORD

Rakshya Thapa outlines priorities for Nepal in the battle against climate change.

an attractive opportunity for furthering sustainable development goals while simultaneously mitigating emissions. Its constraints, however, should not be overlooked. High transaction costs for project preparation and documentation and mainstreaming of CDM in development planning are some of the areas of concerns for a country like Nepal.

Nepal, of late, has gradually recognised the need for enhancing the adaptive capacity of vulnerable communities. Some adaptation measures are already underway. Adaptation to climate change, however, is expensive and a gigantic task. Nepal should ensure adequate funding from the Adaptation Fund and other sources.

There is a crucial need for progress in three areas. First, innovative means of promoting emissions reductions, particularly in the natural resource, transport and industry sectors, including tourism, and at the community level should be explored. Second, adaptive capacity can be enhanced by development aimed at improving the livelihoods, living conditions and access to resources of those likely to experience the worst impacts. It is time to mainstream climate adaptation into development planning and ongoing sectoral decision making. Finally, there is a need for the implementation of favourable policies, institutional set-ups and education and outreach programmes, as well as capacity building for the government, project developers, academic institutions and all civil society so that everyone can respond effectively to the threat of climate change.



Rakshya Thapa has worked with Winrock International, Nepal, and is currently studying for a postgraduate degree at the University of East Anglia, Norwich, UK.