Carbon Audit Report - 2004/05
IUCN - Regional Biodiversity Programme, Asia

Bhujangarao Dharmaji
Balakrishna Pisupati
Azain Raban
Chandima Dabare

Regional Biodiversity Programme, Asia

IUCN
The World Conservation Union

Carbon Audit Report of
IUCN- RBP, Asia
2004/05

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Executive Summary

Background

This assessment, conducted by the IUCN-Regional Biodiversity Programme-Asia ,(RBP) covers the greenhouse gas (GHG) emissions arising from the operation of its offices in Colombo, Sri Lanka for the period between May 2004 - April 2005.

Summary of Emissions

IUCN-RBP, Asia estimates that, during the calendar year 2004-05, the GHG emissions produced from the activities of IUCN-RBP, Asia were equivalent to 397.20 tonnes of CO2. Of the total, 8% of emissions are attributable to business travel; 88% to premises energy consumption*; 6% to staff commuting. A breakdown of emissions is provided in Table 3 and Figure 1.

Recommendations

IUCN-RBP, Asia makes the following recommendations related to reducing carbon emissions.

a. Using power saving non-CFC bulbs in offices
b. Switching on to green electricity, where possible – like use of renewable energy sources (solar lighting, wind mills etc).
c. Sharing car journeys wherever applicable
d. Avoiding travels in rush hour for saving fuel and reducing emissions
e. Servicing and maintaining automobiles on a periodic basis including checking wheel pressure etc
f. Following paper-less office principles, where possible
g. Recycle-reuse-reduce consumption patterns at all times
h. Avoiding bulk photo-copying and taking darker tones of colour design or graphics, where possible
i. Ensuring recycle of paper
j. Reducing water consumption in rest rooms and kitchens
k. Using hand driers instead of tissue papers in rest rooms and elsewhere.
l. Discouraging leaf litter burning and encourage decomposition for generated natural compost used to raise the productivity of its garden in office premises

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* *In Sri Lanka 56.5 % of electricity generated through by Thermal Power Plants by burning fossil fuels. Due to this the consumption of electricity of all establishments/activities in Sri Lanka tend to be energy in-efficient. This is reflected in the high percentage of GHG emissions due to energy use of IUCN RBP located in Sri Lanka.*

1. Introduction

Corporate Social Responsibility (CSR) generally refers to the commitment of an organization to contribute through its own business operations to sustainable development and improve the quality of life of stakeholders. For companies adopting a CSR framework involves a shift from reporting to shareholders profits only and informing their stakeholders on their business practice as well as. Over the last decade, transparency in operations, in particular, has had a profound impact on the way companies operate – in a nutshell, the corporations are becoming increasingly transparent to a general public on issues of environment, human resource management and development.

IUCN-The World Conservation Union vows to be a socially responsible corporate organization. As an organisation dedicated to the conservation and sustainable use of nature and natural resources, IUCN values honesty, integrity and respect for people and the environment. IUCN's draft Corporate Social Responsibility (CSR) framework was also mentioned in the Director General's report on the Work of the Union (http://iucn.org / congress / documents / official / official _documentation_en_07.pdf page 23) and is based on the ISO 9000† and ISO 14000‡ families of standards. The major elements of IUCN's draft CSR policy include:

- Respect for fundamental human rights of individual staff member
- Human resources policies and practices on fairness, openness, and mutual respect
- Leadership in environmental protection including Carbon Neutral Approach for its business operations.
- Transparency in financial and accounting activities and subject them to audit
- Implementation, Commitment and Reporting

The human induced global warming is the most pervasive threat to the web of life. Amongst others, the activities that release CO_2 into atmosphere include burning of fossil fuels, aviation industry and energy sector (IPCC, 2001). This blanket of carbon in the earths stratosphere hinders easy exchange of heat resulting in trapping of large quantities of heat which raises the earth's temperature subsequently.

CO_2 is produced due to activities we indulge in day to day affairs. There are ways in which we can reduce emitting carbon through a range of activities. These are referred as Carbon reduction actions. Eventually, the aim for many corporate houses will be to achieve 'carbon neutral' operations where a series of small adjustments in our daily activities can reduce substantial emissions of carbon. The first step in reducing carbon emissions is to calculate CO_2 emitted as a result of activities such as energy consumption, travel (air, land, and water), solid waste management, photocopying, and courier services and so on. In the case of activities that are CO_2 emitting but still cannot be reduced, they can be neutralized or offset by way of plantation activities

† *ISO 9000 is an international reference for quality management requirements within the business-to-business world*

‡ *ISO 14000 builds on the ISO 9000 standards and deals specifically with environmental management within companies*

(afforestation/reforestation), investing in renewable energy technology projects that can re-absorb atmospheric CO_2 emitted by our activities. This whole procedure is generally referred as Carbon neutrality or Carbon offsetting.

In its maiden effort, RBP is attempting to report on the carbon emissions due to its business related activities including air travel, energy use and local transportation for the reporting period (01 May 2004 to 30 April, 2005). Although other utilities such as water use and paper consumption during the reporting period was compiled, due to non-availability of suitable methodologies for converting these consumptions into CO_2 emissions, they are not considered for calculation in the current report. The CO_2 emissions from other areas mentioned above are calculated using standard methodologies and are quoted in full.

2. Objectives

The over-riding goal of the exercise is to do a carbon audit of RBP's business related activities during the reporting period (May 2004-April 2005). The major objectives of the report include

- Calculate CO_2 emissions due to RBP's business related activities such as air travel, energy use and local transportation
- Convert the CO_2 emissions into dollar equivalents required to offset the CO_2 emissions using existing methodologies

3. Assessment Methodology

General procedure

The approach followed in the carbon audit is mostly from existing methodologies and techniques developed by reputed institutions working under responsible governments. However, the basic elements of calculations such as fuel type, emission coefficients and the automobile mileages for local transport are extracted from the authentic sources including the First National Communication (NatCom) Report of Government of Sri Lanka submitted to the UNFCCC Secretariat and the Energy generation statistics of Ceylon Electricity Board (CEB). Although RBP could calculate its total water and paper consumption during the reporting period, due to lack of appropriate methodologies, emission calculations were not calculated for these utilities. This assessment covers CO_2, CH_4, and N_2O emissions arising from fuel combustion due to air and road travel and in thermal power plants.

Greenhouse gases – overview

A greenhouse gas emission assessment can include all six greenhouse gases covered by the Kyoto Protocol. The six Kyoto gases are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulphur hexaflouride (SF_6), perfluorocarbons (PFCs) and hydrofluorocarbons(HFCs). The global warming potential (GWP) of each greenhouse gas may be expressed in CO2 equivalents For those gases with a high global warming potential, a relatively small emission can have a considerable impact.

Kyoto gas	GWP
carbon dioxide (CO2)	1
methane (CH4)	23
nitrous oxide (N2O)	296
sulphur hexaflouride (SF6)	22,200
perfluorocarbons (PFCs)	4,800 – 9,200
hydrofluorocarbons (HFCs)	12 – 12,000

Source: IPCC (2001).

Note: the 'global warming potential' of a gas is its relative potential contribution to climate change over a 100 year period, where CO_2 =1

4. Data compilation and analysis

Sources for Data analysis and quality

As a part of the methodology, calculations for air travel was done on monthly basis using the carbon calculator developed by Edinburg Centre for carbon Management (Table 1). Although carbon calculations due to energy consumption was done using the methodology developed by Sustainable Energy Authority, Victoria State, Australia, the emissions coefficients of various fuels used in thermal power plants is taken from the first NatCom of Sri Lanka submitted to UNFCCC (Table 2)

Data assumptions

In order to use the conversion algorithms and techniques for calculating CO2 emissions, a number of assumptions had to be made for each sector. Some of these assumptions such as average mileage of petrol and diesel vehicles were considered basing on practical experiences and are presented here.

Energy Use

- *Considering the energy generation statics of CEB, only 56.5% of the total energy usage is considered for calculations as the source of the energy generation is through burning fossil fuels in thermal power plants across the country*
- *RBP uses four air conditioners with 1kwh and one AC with 1.5 Kwh capacity*
- *The air-conditioners and refrigerators are used for 8.5 hrs per day and 20 days per month. These are brand new machine that are CFC free*
- *Average number of employees that worked at RBP offices at any given point of time is six persons during the period.*

Air Travels / Courier usage

- *Average short haul flight is 500 km long*
- *Average long haul flight is 6,495 km long*
- *The dollar value was calculated according to the exchange rate on 30th April 2005.*
- *Air travel of two or more staff members flying in the same flight are considered as two different journeys and CO2 emissions calculated on a individual basis*

Paper consumption

- *Double side printing of paper is mandatory.*
- *Toilet paper is biodegradable and therefore excluded from calculation.*

Local transport

- *Minimum number of working days in a month are 20 days*
- *All unofficial travels not accounted.*
- *The average fuel efficiency of a petrol vehicle assumed as 8.3 km per litre (IPCC, 1996)*
- *The average fuel efficiency of a diesel vehicle assumed as 7.8 km per litre*

Usage of water

- *RBP staff in total use toilets 20 times on an average per day and for each flush it consumes 2 litres of water.*
- *RBP staff consume an average of 40 litres drinking water per week*

Table1 Cost of offsetting CO2 emissions due to business air travel

Month	Total CO2 Emission	Cost of Offset (USD)
May	2.14 tons	$80
June	7.09 tons	$208
July	1.07 tons	$32
August	1.00 ton	$48
September	3.68 tons	$96
October		
November	4.92 tons	$192
December	3.36 tons	$80
January	3.31 tons	$80
February	2.58 tons	$96
March	4.84 tons	$128
April	0.87 ton	$16
Total	**34.86 tons**	**$1,056**

Figure 1: Monthly emissions due to air travel in CO2 equivalents

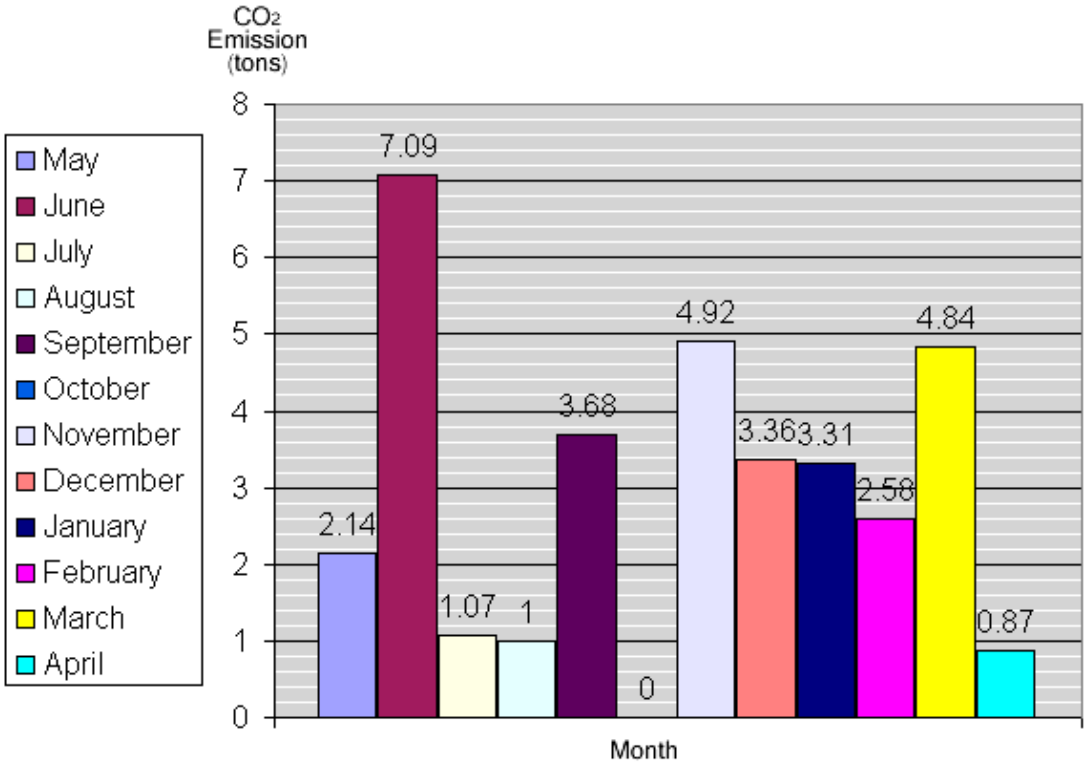


Table 2. GHG emitted due to energy use (Thermal)

Electrical Appliance	No of instruments	Capacity	usage (Per Day)	Per unit energy consumption (kWh)	Total energy consumption (kWh)
Air-conditioning machines	4 no	1kw	8.5 hrs	680 kwh	18,700 kwh
	1 no	1.5kw	8.5 hrs	255 kwh	
Computers	7 nos	.5kw	8.5 hrs	595 kwh	7,140 kwh
CFL Bulbs	1	15w	8.5 hrs	1.275 kwh	3.075 kwh
	1	15w	.5 hrs	.15 kwh	
Micro wave oven	1	1kw	5 min	1.67 kwh	20 kwh
Photo Copy Machine	1	1kw	6 min	2 kwh	24 kwh
Printer	1	100 w	.5 hrs	1 kwh	12 kwh
Refrigerator	1	100 w	8.5 min (6 users in RBP)	.5 kwh	6 kwh
Total				**1506.6 kwh**	**28,977 kwh**

Table 3. Business carbon emissions by RBP and equivalent USD for Carbon offset

Activity	Usage	CO2 Conversion methodology used	Co2 Emitted (in tones)	Dollar equivalent for C offset (USD)	Source for methodology
Local travel Petrol	534 L	tCO2-e=QxEF÷1000	10.0926	305.62	Sustainable Energy Authority, Australia: National Communications and Ceylon Electricity Bord (CEB) of Sri Lanka;
Local travel Diesel	580 L	tCO2-e=QxEF÷1000	11.716	354.87	Sustainable Energy Authority, Australia: National Communications and Ceylon Electricity Bord (CEB) of Sri Lanka

Energy Use**	28,977 kwh	tCO2-e=QxEF÷1000	340.538	10,314.90	Sustainable Energy Authority, Australia: National Communications and Ceylon Electricity Bord (CEB) of Sri Lanka
Air Travel	260,761 km	0.18 kg/pass km (S) 0.11 kg/pass km (L)	34.86 tons	$1,056	Edinburgh Centre for Carbon Management, UK (Future Forests Carbon Calculator)
TOTAL			**397.20 tons**	**USD 12,031.39**	

Where:

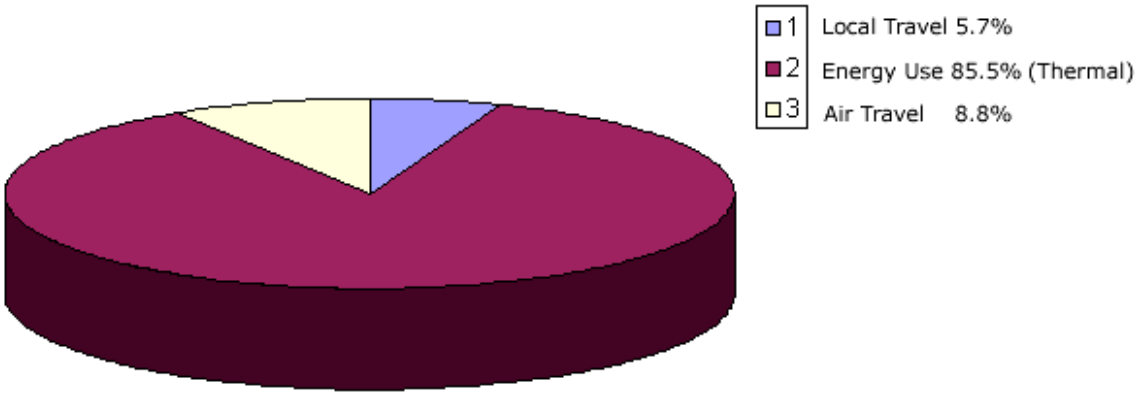
tCO2-e is the greenhouse gas (GHG) emissions in tones of carbon dioxide equivalent; Q is the Activity and expressed in kilo Watts (kWh) or Litres (l) or kilo grams (kg); EF is the Emission Factor adopted from First National Communications (NatCom) submitted by Government of Sri Lanka to UNFCCC as part of its Green House Gas (GHG) inventory in 2000.

**Sources of electricity generation in Sri Lanka from Hydro power is 43.5% while the rest is generated by burning fossil fuel based thermal power 56.5%. The major fossil fuels used in thermal power plants are furnace oil, residual oil and diesel . (CEB, 2003).*

*** The Fuel Carbon Emission Factor (tC/TJ) for various fuels as adopted from First NatCom of Sri Lanka includes*

Gasoline (petrol)	*18.9*
Diesel	*20.2*
Furnace Oil	*21.1*
Residual Oil	*21.1*

Figure 2. Major sectors contributing to the emissions of IUCN-RBP



5. Analysis of results

During the reporting period, the activities that had contributed to GHG emissions due to RBP's activities include

- Business related air travel
- Thermal energy use in RBP offices
- Local transportation of staff members

During the reporting period, the total air travel done by RBP staff is 260,761 km, amounting to release of 34.86 tons of Carbon (figure 1). The conversion of carbon emissions to the corresponding dollar equivalent is based on a number of assumptions and includes:

1. Short haul flights (0-3000 km) ---- 0.18 kg CO2 emitted per passenger km
2. Long haul flights (>3000 km)---- 0.11 kg CO2 emitted per passenger km
3. The flights are direct
4. Journey is return trip
5. The cost of planting 1 tree or 1 energy saving light-bulb to a backward community in a developing country is equivalent to offsetting 1 ton of CO2

The methodology used for calculating the carbon emissions due to air travel is done using the online carbon calculator provided by the Edinburgh centre for Carbon Management through the URL. The carbon offset calculations also suggest the source is by spending USD 8.5 for planting one single tree and / or one single CFL bulb.

Following the assumptions and methodology as described above the dollar equivalent required to offset carbon emissions due to RBP's business related air travel is USD 1,056, which is equivalent to planting about 125 trees or investing in 125 CFL Lamps (Table 1 & 3, Figure 1). The calculations also reveal that USD 30.29 is required on an average to sequester every ton of carbon due to airline travel, be it short or long haul flights.

As there are no easy and straight forward methods to calculate CO_2 emissions due to energy production and use, a variety of methods were deployed. However, the crucial emission factors required for calculations were used from

the first National Communication (NatCom) of Sri Lanka submitted to UNFCCC Secretariat in 2000.

Another point of interest is the fact that energy production in Sri Lanka is from various sources. Although hydro power contributes 43.5% of total grided energy production, a combination of fuels used in thermal power plants such as furnace oil, residual oil, and diesel together contribute to production of the rest 56.5% of the power. It is to be noted that hydro power plants do not contribute to GHG emissions while generating electricity and hence may be referred as Clean production technologies as opposed to power generation through thermal plants, which emit substantial GHGs into atmosphere while producing energy. Therefore, the emission coefficients of various fuels used in thermal power plants were considered from the first natCom of Sri Lanka, while the equation to convert power consumed into CO2 emissions were taken from the Sustainable Energy Authority of Australia. Further, only 56.5 % of the total power consumed is calculated for GHG emissions, as the rest comes from cleaner hydro plants of the country.

The CO_2 emissions due to energy use (56.5%) in RBP offices revealed that about 340 tons of carbon is released (Table 2). As the type and nature of fuel used in aviation industry is similar to the fuels used in thermal based power plants, the average cost per ton carbon sequestration of USD 30.29 calculated for Carbon offsetting due to emissions from a air craft is assumed same as sequestering one ton of carbon due to burning of above mentioned fuels in thermal power plants. Hence the total emissions due to energy use (56.5%) in RBP offices is 340.5 tons. To offset this, USD 10,314.90 is required to plant 1214 trees or provide 1214 CFL bulbs to a needy community in a developing country.

Similarly, the carbon emission calculations due to use of local transport was calculated separately for all local travels in petrol and diesel vehicles during the reporting period. The methods used for calculating carbon emissions are from sustainable energy authority, Australia. However, the emissions factor of petrol and diesel vehicles are considered as reported by the Sri Lanka's First NatCom to the UNFCCC. In total, 1,114 litres of fuel was consumed for local commuting resulting in 21.8 tons of carbon emission (Table 2). To offset the carbon emissions due to local transportation, an amount of USD 660.50 should be invested in planting 78 trees or providing 78 CFL bulbs to a needy community in a third world country (Table 3).

6. Conclusion

IUCN-RBP, Asia estimates that, during the calendar year 2004-05, the GHG emissions produced from the activities of IUCN-RBP, Asia were equivalent to 397.20 tonnes of CO2. Of the total, 8% of emissions are attributable to business travel; 88% to premises energy consumption; 6% to staff commuting. A breakdown of emissions is provided in Tables 3 and Figure 2.

The bulk of carbon emissions are due to energy use. However, it can be argued that since RBP is using electricity in Sri Lanka that is not energy efficient, the resulting carbon emissions could be high. If that be the case, excluding the carbon emissions due to energy use, the total carbon emissions due to RBP's business related activities is 56.66 tons, requiring USD 1716.23 to offset the emissions through planting about 201 trees or providing 201 CFL bulbs to needy community in a developing country. Considering this, RBP

could invest USD 1717 in an afforestation activity in one of the developing countries of the region.

Although carbon emissions due to paper consumption could not be calculated due to lack of appropriate methodologies, RBP does realize that production of paper involves harvest of certain species of trees / shrubs that store carbon. As a policy matter, RBP does not dispose off the paper as solid waste but encourages recycling of paper.

7. Reduction measures

There are a range of measures that can be implemented to reduce emissions from these sources. These are discussed below.

Reducing business travel emissions

Emission reductions could be achieved by increasing the use of teleconferencing and videoconferencing, as this would reduce the need for employees to travel to meetings. A further benefit of this is that it will also reduce the number of hotel night stays that staff must undertake when they are abroad for meetings. Reduction in emissions could be achieved by encouraging staff to travel to meetings only when absolutely necessary. IUCN-RBP, Asia should investigate the need to travel to meetings as well as the opportunities for tele-conferencing.

Reducing electricity consumption related emissions

If IUCN can source its electricity form renewable suppliers such as wind or hydroelectric power then the emissions associated with purchased electricity would be zero. Presently, IUCN-RBP, Asia major source of emission is due to use of electricity, where production comes predominantly (56.5%) from thermal power plants in Sri Lanka, equivalent to 340.5 tonnes of CO_2

Staff behaviour

A PC monitor left on standby uses 51 kWh of electricity per year. In an office with one hundred computers, GHG emissions could be reduced by over two tonnes if the monitors were simply switched off at night rather than being left on standby. Encouraging staff to switch off monitors, PCs, photocopiers and printers at night could reduce electricity consumption and associated emission by up to 20% compared with leaving them on standby. These substantial reductions can be achieved at no additional cost.

Purchasing energy efficient equipment

Changing old office lighting and appliances for more modern energy efficient varieties will reduce electricity consumption and its associated GHG emissions. For example energy saving light bulbs typically use 25% of the energy of normal bulbs, produce the same quality of light and last 8 to 12 times longer. IUCN should ensure that when they purchase new equipment it is the most efficient equipment available and in the case of photocopiers, monitors, printers and PCs that there are energy saving standby modes available.

Reducing emissions from staff commuting

Emissions from staff commuting could be reduced by encouraging staff to adopt car pool schemes or by encouraging the use of public transport. Incentives could be introduced to encourage staff to adopt such practices and targets could be set to reduce the use of cars for commuting by one third.

8. Ways Forward

Considering the imminent and urgent need to reduce CO_2 emissions to mitigate global warming, the following "best practices are shared as recommendations for wider use among IUCN units across the globe:

a. Using power saving non-CFC bulbs in offices
b. Switching on to green electricity, where possible – like use of solar lighting etc.
c. Sharing car journeys wherever applicable
d. Avoiding travels in rush hour for saving fuel and reducing emissions
e. Service and maintain your vehicles on a periodic basis including checking wheel pressure etc
f. Following paper-less office principles, where possible
g. Recycle-reuse-reduce consumption patterns at all times
h. Avoiding bulk photo-copying and taking darker tones of colour design or graphics, where possible
i. Ensuring recycle of paper is encouraged, including by sending them to recycling units
j. Reducing water consumption in rest rooms and kitchens
k. Using hand driers instead of tissue papers in rest rooms and elsewhere.
l. Discouraging leaf litter burning and encourage decomposition for generated natural compost used to raise the productivity of its garden in office premises

RBP strongly encourages and offers technical support to other IUCN units in Asia and globally that intend to do a carbon audit to estimate carbon emissions resultant due to their business operations as described above.

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IUCN – The World Conservation Union

The World Conservation Union is the world's largest and most important conservation network. The Union brings together 82 States, 111 government gencies, more than 800 non-governmental organizations (NGOs), and some 10,000 scientists and experts from 181 countries in a unique worldwide partnership.

The Union's mission is to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.

The World Conservation Union is a multicultural, multilingual organization with 1000 staff located in 62 countries. Its headquarters are in Gland, Switzerland.

Regional Biodiversity Programme, Asia (RBP)

IUCN's Regional Biodiversity Programme, Asia (RBP) was established 1996 to assist countries in Asia implement the Convention on Biological Diversity. Working with 14 countries in Asia, RBP is creating an enabling environment in the region through partnership with governments, NGOs, community based organisations, donors and other stakeholders on technical as well as policy issues.

IUCN Regional Biodiversity Programme, Asia
53, Horton Place
Colombo 7
Sri Lanka.

Tel : ++94 11 471 0439, ++94 11 266 2941
(direct), ++94 11 269 4094 (PABX)
Fax : ++94 11 266 2941
Email : rao@iucnsl.org
Web : www.biodiversityasia.org