



Brunei Darussalam

Environmental Health Country Profile

World Health Organization

As of November 19, 2004



1 Development, Environment and Health Status

1.1 Development Pattern of the Country

1.1.1 Maps / Geography / Demography / Urban-rural Trends

Brunei Darussalam, located in the northeast part of Borneo, is separated by Sarawak into an eastern part (Temburong district) and a western part (Brunei/Muara, Tutong and Belait districts). Brunei Darussalam has a total land area of 5,765 sq km with the capital, Bandar Seri Begawan, located at Brunei/Muara district in the north. Seria in the south is the seat of the oil and gas industry, the main industry in the country responsible for its continuous prosperity. The whole country has a tropical climate with annual rainfall between 2,500 mm to 7,500 mm with about 80 percent of the total area covered by tropical rainforest.

Brunei Darussalam has the lowest population in ASEAN with 348,800 people consisting of about 74 percent Malays, 16 percent Chinese and the rest other races. The number of males is slightly higher (50.5 percent) than females (49.5 percent) with an annual increase in population at 2.3 percent (2003). The population distribution shows that 29.5 percent are less than 14 years old and three percent are over 65 years old. About 71.7 percent of population lives in urban areas.

The national literacy rate is above 90 percent with an average life expectancy of 75 years. The infant mortality rate and under-five mortality rate are among the lowest in the region at 9.50 per 1000 live births and 11.80 per 1000 live births for the year 2003, respectively. The Government heavily subsidizes health care, housing and education. Brunei Darussalam meets all the ten global health indicators of WHO as well as the UN Millennium Development Goals (MDG).

1.1.2 General Economy of the Country

The people of Brunei Darussalam enjoy one of the highest standards of living in the world with a per capita GDP at US\$12,823 in 2002 with an annual growth rate of 3.2 percent. The Government spends 2.66 percent of its GDP on health. In 2001, the total working population was about 145,600.

Brunei Darussalam is the third largest oil producer in Southeast Asia, averaging about 20,000 barrels a day. Brunei Shell Petroleum (BSP), a joint venture between Brunei Government and the Royal Dutch/Shell group of companies is the chief oil and gas company in Brunei Darussalam. BSP along with along with four sister companies are the largest employer in Brunei Darussalam after the Government. Brunei Darussalam is the

fourth-largest producer of liquefied natural gas in the world processed at the Brunei Shell's Liquefied Natural Gas (LNG) plant, one of the largest in the world opened in 1972.

Oil and gas revenues accounts for most of Brunei Darussalam's economic activity. Brunei Darussalam's proven oil and gas reserves are sufficient until at least 2015, and planned deep-sea exploration is expected to find significant new reserves. Initiative on exploring new ventures among non-petroleum industries has also been undertaken in the past decade by the Government including in agriculture, forestry, fishing and banking. Agriculture and fisheries are among the industrial sectors identified as high priority for development in diversifying the country's economy. Around 3.2 percent of land in Brunei Darussalam is currently used for agricultural purposes.

1.1.3 Development Priorities

The Eighth National Development Plan (2001-2005) has allocated B\$1 Billion for projects and other development programs to strengthen industry and commerce in Brunei Darussalam. Pollutive industries will not be allowed in the country. The agricultural sector will be strengthened to cover poultry, fruits, vegetables, decorative plants and landscaping, fisheries and forestry. The manufacturing sector is to be developed in the areas of food processing, garment, furniture and equipment through small and medium scale industries (SMEs). The local SMEs are gearing towards increase opportunity in the tourism industry in addition to wholesale and retail stores, information technology industry, banking, construction and other trade and service sectors.

To diversify the economy in addition to the oil and gas industry, Brunei Economic Development Board (BEBD) has announced five large projects for implementation with foreign investors. An industrial area (Sungai Liang) has been earmarked to locate (a) an aluminum smelting plant (b) ammonia plant at 2,000 tons per day (c) urea plant at 3,500 tons per day (d) methanol plants at 2,500 tons per day, and (e) a plant for derivatives of olefins and aromatics from naphtha cracker. A giant container hub will also be constructed to augment the Muara Port facilities.

In achieving sustainable development and maintaining a clean environment for Brunei Darussalam, an environmental impact assessment is expected to be conducted for these large scale development which will inevitably have both environmental and health impacts. In appreciation of these impacts, the National Health Care Plan (2000-2010) has specially identified issues related to environmental health under the strategic themes of "Enhancing Health Care Services". This is further highlighted under the strategic goals of "Promotion of Primary Health Care (PHC)" whereby one of the objectives outlined for Stage 2 (Protection of Life) is "strengthening policies and programmes on environmental health to ensure a safe and healthy environment for public health". Significant milestones have been achieved in support of this objective, including the promotion of the Environmental Health Services as a functional department with its own director under the Department of Health Services as of the 1st February 2004. In promoting awareness in the general community, "Healthy Settings" was one of the themes chosen during the 1st National Convention on Healthy Lifestyle launched by His Majesty the Sultan and Yang

DiPertuan Brunei Darussalam in July 2004. Follow-up activities are being actively planned and pursued alongside with reviews to identify areas for strengthening and improvement.

1.1.4 Human Development Index

This is a composite index developed by the United Nations Development Programme based on three indicators: longevity, as measured by life expectancy at birth; educational attainment, as measured by adult literacy and total primary, secondary and tertiary enrolment ratio; and standard of living, as measured by GDP per capita. The Human Development Report 2004 indicates that Brunei Darussalam is in the high HDI level with an HDI of 0.87 and ranks 33 out of 177 countries.

1.2 Existing Services Levels

1.2.1 Proportion of National Population With Existing Utilities (water supply, sanitation, solid waste collection, drainage, sewerage, electricity)

In 2002, around 99 percent of the population has access to safe water and around 80 percent have access to sanitary facilities. An estimated 370 MLD are produced from the seven water treatments plants throughout the country that serve piped water to about 95 percent of the population. More than 70 percent of the population is served by sewerage system with each district apart from Temburong District having its own sewage treatment plant. It is estimated that the whole country is almost covered with electricity supplies.

1.2.2 Proportion of urban population served by piped water, sewers, electricity, municipal solid waste collection

Septic tanks are popularly used in all four districts followed by sewerage system with only limited occurrence of direct discharge to watercourses. Marked improvement in sewerage collection has been implemented in the coastal residences of Kampong Ayer. Traditionally houses built on stilts along the Brunei River had traditional sewerage disposal. However, all new houses built under the Kampong Ayer resettlement projects are connected to a close sewerage system. Almost 100 percent of urban households are served with electricity, piped water and municipal solid waste collection.

1.2.3 Presence of other basic services such as fire fighting and emergency management (flood, earthquake, chemical emergency, etc)

In the management of crises and emergencies, several Government agencies work closely together. The Fire Service Department has a HazMat Team to deal with the immediate emergency needs to contain any emergencies hazardous in nature such as chemical and oil spills. This is done in close collaboration and consultation with the Department of Environment, Parks and Recreation, Department of Health and Department of Medical Services. In the event of other significant national emergencies, other relevant agencies will also be incorporated in accordance to the National Emergency Response Plan. At present, the emergency response and coordination

procedure for any chemical accidents Brunei Shell Petroleum (BSP) has been drafted to be finalized in which the HazMat team as well as other relevant Government agencies play a key role.

1.2.4 Housing: Presence of building regulations, proportion of people living in informal settlements

Provision of safe and comfortable housing for its citizen is one of the priority areas addressed by the Government of Brunei Darussalam. Government employees are provided with subsidized housing or housing loans. In addition, the ongoing Government's Housing Resettlement Scheme implemented over the years has also seen to marked improvement in the quality of life for the general population.

All structures constructed are subject to the National Building Regulation, which has been formulated by the Public Works Department. This regulation incorporates standards and requirements of all relevant agencies where health is a component.

1.2.5 Transport related: number of vehicles registered, number of motorcycle registered, rate (number per 100,000 population)

In 2003, the cumulative number of registered vehicles in Brunei Darussalam has reached 244,732 including 7,628 motorcycles. Private ownership of cars is popular with almost everyone owning at least one car. Public transports such as private buses are few and serve only in major roads.

1.2.6 Capacity for monitoring environmental quality (drinking water, water resources, ambient air, noise, radiation, etc)

There are both Government and private laboratories that can analyze a wide range of environmental quality parameters. The Environmental Health Services, Department of Health Services, Ministry of Health carried out routine air quality monitoring of five parameters 24 hours a day (PM₁₀, SO₂, NO_x, O₃, and CO) from 1993 to 2003. Since 1st April 2004, the facilities and hence the monitoring were handed over to the newly established Department of Environment, Parks and Recreation, Ministry of Development.

The Department of Scientific Services (DSS), Department of Health Services, Ministry of Health established in 1990 provides centralized scientific support services in Brunei Darussalam in the areas of public health and law enforcement. Its Environmental Laboratory has the most up-to date analytical equipments with the capacity to analyze a full range of parameters for water quality, trace elements and organic compounds. Large private companies and hospitals have their own well-equipped laboratories. In addition, health inspectors routinely carry out inspections and checks on quality of drinking water and swimming pools using portable water-quality field testing kits.

1.2.7 Capacity for data collection and processing

There is physical capacity for data collection and processing for environmental health. The system of data collection currently in place is fragmented located at various government agencies, the type and nature of which is in accordance to the service served. Active sharing and utilization of these data by and between the relevant agencies are ongoing to maximize the outcome of the various environmental programmes as well as in the review, planning and implementation of environmental related activities.

1.3 Environmental Quality

1.3.1 Air pollution (percentage of population using solid fuels, proportion of vehicles using diesel and unleaded gasoline, frequency of exceeding national air quality standards)

Routine monitoring of ambient air quality was initiated in 1997, following the incidence of severe haze due to bush fires from neighboring countries. Although the ambient quality of Brunei Darussalam is generally good, transient heavy traffic congestion does occur especially during lunch break and rush hour after work. Around 65 percent of motor vehicles use unleaded gasoline with about 35 percent using diesel especially four wheels drives vehicles. Occasional mild haze has increased the particulate matter levels above normal.

Indoor air pollution is not a concern as majority of households use either LRG or electricity for cooking. Outdoor cooking such as barbecues and grilling using charcoal or LPG are also popular throughout the year.

1.3.2 Water pollution (frequency of exceeding national water quality standards, drinking water quality standards)

Brunei Darussalam has excellent facilities for the treatment of its drinking water sourced from surface water, which is treated at six Government treatment plants situated throughout the country. In addition, BSP and LNG manage two other facilities privately. There are also bottled water factories using advanced technology to produce purified water.

Monitoring of treated water at treatment plants, storage points and end-points are carried out daily by the Department of Water Services, Public Works Department, and Ministry of Development. In addition, the Department of Health Services also audits the quality of water at the treatment plant and end-points.

1.3.3 Solid waste (generation of municipal solid waste, proportion of recyclables)

There is no information on the amount of municipal solid waste generated in Brunei Darussalam but it may very well be around 2 kg per capita per day which is recorded in the neighboring countries that use more packaging materials. There is several controlled landfills in the country located at least one in every district. In addition, one engineered landfill is managed privately by the BSP. At present the landfill located in Brunei-Muara

district is nearly reaching full capacity. The relevant agency has taken steps to reduce the volume of waste brought to this landfill including having compactors on main roads and segregating metal waste. Plan for relocating the landfill and to have incinerator facility has been formulated to address this issue alongside recycling.

1.3.4 Hazardous waste (generation of toxic chemicals, hazardous materials, health-care waste, nuclear waste)

Dioxin generation estimation done in 2001 in Brunei Darussalam is about 195,040 kg originating from health care waste from three districts (except Temburong district). A double chamber incinerator (1000°C) is available at RIPAS Hospital, which receives hospital waste for combustion twice weekly. The amount of chemical and hazardous waste for disposal is unknown but the Brunei Shell has a sanitary landfill that accepts both solid waste and asbestos.

1.4 *Public Health Statistics*

1.4.1 Ten leading causes of mortality and morbidity

The ten leading causes of inpatient mortality for 2003 are : 1)Asthma, 2)Pregnancy with abortive outcome 3)Acute upper respiratory infections 4)Fractures of specified and multiple body regions 5)Heart diseases 6)Non-inflammatory disorders of female genital tract 7)Maternal Diseases Classifiable but Complicating Pregnancy, Childbirth and the Puerperium (Indirect Obstetric Causes) 8)Anemia 9)Gastroenteritis/Diarrhea 10)Diabetes mellitus. Three out of the ten leading causes of illness which could be attributable to environmental factors namely, asthma, acute upper respiratory infections and gastroenteritis/diarrhea.

The ten leading cause of mortality in 2003 are: 1)Heart disease (including acute rheumatic fever) 2)Cancer 3)Diabetes mellitus 4)Cerebrovascular diseases 5)Bronchitis, chronic and unspecified emphysema and asthma 6)Influenza and Pneumonia 7)Hypertensive diseases 8)Certain conditions originating in the perinatal period 9)Transport accidents 10)Congenital malformations, deformations and chromosomal abnormalities. Most of the diseases are related to modern lifestyle replacing infectious diseases of the past. Although the effects differ from one person to another, literature listed poor environmental factors which could promote cardiovascular diseases, acute rheumatic fever, and asthma and traffic accidents.

1.4.2 Diseases associated with agriculture and irrigation development

Brunei Darussalam has been declared malaria-free by WHO in 1987. New cases reported (17 in 2003) since were all imported cases. Malaria vigilance activities continue to be maintained and implemented by the Department of Health Services.

1.4.3 Respiratory diseases related to outdoor air pollution from energy, transport and industry sectors

Asthma and acute respiratory diseases are found in the top 5 illnesses in the country. These diseases are often associated with poor air quality both indoors and outdoors. Detail study and analysis need however to be conducted to ascertain the association between the disease and the air quality in Brunei Darussalam.

1.4.4 Traffic crashes (mortality due to traffic accidents, rate:deaths/100,000 population, injuries due to traffic accidents, rate:injuries/100,000 population)

In 2002, 2,838 traffic accidents were recorded with 549 injuries and 43 deaths. The rate of accidents per 1000 vehicles is 12.

1.4.5 Diseases relating to poor housing (including pulmonary diseases, tuberculosis)

A total of 204 cases of tuberculosis (rate 58.4/100,000 population) were reported in year 2003. One third of the TB cases were non-Bruneians. Rheumatic fever and rheumatic heart disease are not notifiable in Brunei Darussalam and only few cases are reported which are either old or imported cases.

1.4.6 Water supply and sanitation-related diseases (such as diarrheal diseases, hepatitis, cholera, typhoid)

Diarrhoeal diseases notifiable in Brunei Darussalam include cholera, dysentery, food poisoning, gastroenteritis, hepatitis A, paratyphoid and salmonella. In the year 2003, 1214 cases were reported both as sporadic cases as well as in clusters associated with food poisoning outbreaks. Outbreaks tended to occur in institution like schools. These were found to be mainly due to mass production of packed food, which is associated with breaches in food safety practices such as improper storage and prolonged period between food preparation and actual food consumption.

1.4.7 Vector-borne diseases (such as malaria, plague, dengue fever and dengue hemorrhagic fever)

Brunei Darussalam has been declared malaria-free by WHO in 1987. Cases reported (17 in year 2003) were all imported cases. In December 2002, a total of 26 cases of dengue fever were reported in Brunei-Muara district. The outbreak was sustained in early 2003 with a six-fold increase in notification and occurring in three districts. The epidemiological and serological investigation of the cases in 2002 and 2003 confirmed the occurrence of secondary transmission among immediate contacts. However, with prompt intervention focusing on source reduction, no further transmission occurred.

2 Legal, Policy and Institutional Structure

2.1 Legislative and Policy Framework

2.1.1 National policies, plan or strategies for environmental health

Policies on environmental health are stipulated in various administrative orders or circulars and not in regular legislation. There is a National Health Care Plan (2000-2010), which contains key strategic areas for health promotion and disease promotion and disease prevention.

There is currently no Public Health Act in Brunei Darussalam that stipulates environmental health functions. The Department of Health Services will undertake work on this matter. There is, however, an environmental policy with the following goals:

- a) To maintain sustainable utilization of natural resources.
- b) To minimize negative impacts on environment arising from population growth and human activities.
- c) To achieve balanced goals of socio-economic development and sound environmental quality.

There are administrative policies on health promotion and ban on smoking in public places. Currently, there is no national policy specifically for health settings but the principles of healthy cities have been in place in the country for many years.

2.1.2 Relevant legislation addressing environmental health issues (such as Public Health Act, Clean Air Act, environmental/health impact assessment)

The following ten legislations are relevant to environmental health in Brunei Darussalam:

- a) Petroleum Mining Act, amended 1992 (Chapter 44)
- b) Forest Act (Chapter 46)
- c) Water Supply Act (Chapter 121)
- d) Poison Act (Chapter 114)
- e) Town and Country Planning (Development Control Act (Chapter 142)
- f) Municipal Board Act (Chapter 57)
- g) Ports Act, amended 1988 (Chapter 144)
- h) Land Code (Chapter 40)
- i) Agriculture, Pest and Noxious Plant Act (Chapter 43)
- j) Infectious Disease Order 2003

Noteworthy is the prohibition for open burning with a penalty of B\$100,000 (1US\$=1.7 B\$) and imprisonment of up to 5 years.

Although the draft Environmental Impact Assessment Regulation is as yet not approved, in principle the Government requires EIA for large and heavy industries such as in the planned ammonia/urea, methanol and aluminium smelter plants. Brunei Shell has the expertise in HIA and health and safety. The Environmental Health Services, Department of Health is also gearing towards attaining similar skill among its manpower.

2.1.3 Decentralization and / or privatisation policies dealing with environmental health

The responsibility for environmental health monitoring rests with the national and central government agencies and no plan for decentralization or privatisation of these functions.

2.2 *Institution Structure for Environmental Health*

2.2.1 Administrative / organizational set-up of the country

Within the MOH's Department of Health, the Environmental Health services have four divisions namely:

- i) Disease Control Division
- ii) Environmental Health Division
- iii) Occupational Health Division
- iv) Food Quality and Safety Division

The Environmental health Division has seven units:

- a) Pollution Control
- b) Building Plan and Development
- c) Malaria vigilance and vector control
- d) Entomology/parasitology
- e) Foreign Workers Screening
- f) Vaccination Centre
- g) Port Health

Refer to the attached organizational charts in Annex A

2.2.2 Role of Government, private sector, non-government organizations, international organization and partnerships in environmental health

Non-governmental organizations and international development agencies are not present or active in Brunei Darussalam

2.2.3 Other agencies involved and their respective functions

At least eight other agencies are actively involved directly or indirectly on environmental health:

- a) National Committee on Environment (Chaired by The Minister of Development)
- b) Department of Environment, Parks and Recreation, Ministry of Development
- c) Department of Water Services, Ministry of Development
- d) Department of Sewerage and Drainage, Ministry of Development
- e) Ministry of Industry and Primary Resources
- f) Ministry of Home Affairs
- g) Hygiene Services of Medical Services, Ministry of Defense
- h) Environmental Health Services, Panaga Health Centre.

2.3 *Relevant International Conventions and Agreements Ratified or Signed*

Brunei Darussalam is party to seven international treaties as follows:

- a) Vienna Convention for the Protection of the Ozone Layer
- b) Montreal Protocol on Substances that Deplete the Ozone Layer

- c) Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- d) Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal
- e) Framework Convention on Climate Change
- f) Convention on Biodiversity
- g) Framework Convention on Tobacco Control

The implementation of these agreements mainly lies with the Department of Environment, Parks and Recreation, which has limited capacity. Other agencies also have a role in the implementation such as the Prime Minister's Office, Ministry of Home Affairs, Ministry of Industry and Primary Resources, Ministry of Health etc.

3 Human Resources Development Programs

3.1 Environmental Health Workforce, Professionals and their Skills

Within the Ministry of Health, there are 162 employees classified as 'other health personnel' that include health inspectors, health assistants and health field workers. Among these are 39 technical staff consisting of public health officers and health inspectors with a ratio 1 health inspector per 10,000 populations.

There are six environmental officers currently employed at the Environmental Unit of the Department of Environment, Parks and Recreation. With the important mandates of the Environmental Unit, it would require more qualified personnel to make sure that sustainable development is achieved in Brunei Darussalam.

3.2 Formal and Informal Training Programs for Environmental Health

Environmental Health and environmental practitioners in Brunei Darussalam have been trained overseas mostly in the UK, Australia, Malaysia and Singapore. There are no short courses being offered locally. The University of Brunei Darussalam has recently offered a master's degree on environmental management but there is no undergraduate degree related to environmental health in the country.

3.3 Government Certification

Currently government certification is not yet established as a requirement to professional practice in the field of environmental health, but most are degree holders. This may be due to the low number of environment and environmental health professionals practising in the country. The medical and allied health personnel are required to be registered by the Government.

3.4 Professional Associations

There are no professional associations yet formed in both the health and environmental fields and there are no local chapters of international associations.

4 Priority Environmental Health Issues

The priority environmental health issues in Brunei Darussalam are:

- a) Solid waste management
- b) Seasonal smoke/haze from regional forest fires.
- c) Urban growth
- d) Water pollution
- e) Shifting cultivation

4.1 *Agriculture Sector*

The use of pesticides and fertilizers is still limited as there are only 1000 hectares of irrigated agricultural area. Spraying for vector controls are routinely done at several designated areas such as international airport, military camps and areas designated in the malaria vigilance programme. Also emerging is the shifting cultivation from forestry to farming as well as farming to urban development thus producing open, barren land that produces dust.

4.2 *Energy Sector*

The energy sector has provided the economic prosperity for Brunei Darussalam. It has contracts with two consortia for the exploration and refining of oil and gas. These multinational companies have strong environmental, health and safety policies and facilities that avoid the adverse impacts of their activities. Environmental impact assessment is carried out as necessary for new development projects.

4.3 *Industry sector*

A total area of 705 hectares will be developed for industrial development in the four districts. There are nine garment factories and in the pipeline are five large-scale plants for ammonia/urea, methanol, petrochemicals, aluminum smelter and the Muara container facilities. In 2000, there are 5,784 registered SMEs in the country, which contributed more than 65 percent to the nation's GDP. All these projects will have concomitant environmental and health issues such as air and water pollution, chemical emergencies, solid and hazardous waste management, which need to be mitigated.

4.4 *Transport Sector*

As the standard of living in Brunei Darussalam is one of the highest in the world, almost everyone can afford vehicle ownership. Related concerns are road safety, traffic crashes, ambient air pollution, traffic congestion and increase non-communicable diseases such as diabetes and cardiovascular diseases.

4.5 Urban / Rural Development Sector

There is an increasing concern for urban growth; currently 72 percent of the people living in the towns. With human settlement development, it is expected to generate more wastewater and solid waste. Due to increase income, the generation rate for municipal solid waste is expected to rise. Currently, the facilities for the treatment and disposal of solid waste are limited. Hence expansion in facilities to accommodate the expected increase, waste reduction, recycling and solid waste management as a whole, needs to be considered.

4.6 Cross-cutting issues

Mechanism to address seasonal haze from forest fires had been largely unresolved since 1997. The factors responsible for the haze include outbreaks of forest and land fires (peat and coal) in neighboring countries as well climate change during drought. Monitoring of air quality found elevated levels of total suspended particulates and reduced visibility.

5 Areas Requiring Improvement

5.1 Specific Policies and Legislation for Environmental Health

To strengthen Brunei Darussalam's position on protecting its citizen and its environment from adverse effects of industrial development and urbanization, the following important legislations might be considered for enactment:

- A. A motherhood policy on Environmental Health which consolidates the various relevant laws currently found in various ministries and providing for new provisions to support Brunei Darussalam's development goals.
- B. Environmental Protection Act consisting of the following provisions:
 - a) Environmental Impact Assessment for new industries and development projects.
 - b) Environmental Quality Management for water, air and noise pollution, solid waste, toxic and hazardous substances
 - c) Functions, powers and authorities for the environmental agency
 - d) Compliances and enforcement strategies

5.2 Institutional Development and Inter-sectoral Collaboration

There appears to be well-established institutions in Brunei Darussalam addressing environmental health, notably within the Department of Health Services, Ministry of Health and the Department of Environment, Parks and Recreation, Ministry of Development. There are also mechanisms within the Government for networking and collaboration among the various departments and also with the private sector.

5.3 Human Resources Development

The current environmental health staff of Brunei Darussalam needs further strengthening. Environmental officers and inspectors also require augmentation both in terms of numbers and capacity. Planning for human resource development should support the projected growth of Brunei Darussalam. University courses on environmental health and environmental science should be developed to produce trained manpower not just within the country but also for neighboring countries.

5.4 *Monitoring and Surveillance*

Monitoring and surveillance of environmental quality should continue to be undertaken on a regular basis. Efforts to bring systematically together information generated from the various sectors needs to be explored and housed centrally. A State of the Environment report should be prepared for Brunei Darussalam's decision makers and citizens on an annual or biannual basis. Brunei Darussalam's vision to develop its own niche in information and computer technology should be taken advantage through development of an interactive surveillance network for both environment and public health monitoring.

5.5 *Integration of Health and Environment in International /Regional Agreements*

Brunei Darussalam has been reaching out to its neighbors for economic cooperation with the principles of public health and environmental protection considered as part of its goal of achieving sustainable development. Brunei Darussalam Economic Board (BRDB) should be sensitized with the link between health, environment and development.

5.6 *Others*

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Appendix

BRUNEI DARUSSALAM
Environmental Health Data Sheet
As of November 19, 2004

	INDICATORS	DATA	Year	Source
1	Development, Environment and Health			
1.1.1	Area (1000 km ²)	5.77	2003	1
1.1.1	Estimated population ('000)			
	-Total	348.80	2003	1
	-Male	176.30	2003	1
	-Female	172.50	2003	1
1.1.1	Annual population growth rate (%)	2.30	2003	1
	Percentage of population			
	-0-14 years	29.50	2003	1
	-65+ years	3.0	2003	1
1.1.1	Urban population (%)	71.70	2001	1
1.1.1	Adult literacy rate (%)			
	-Both sexes	...		
	-Male	94.60	2002	1
	-Female	90.00	2002	1
1.1.1	Infant mortality rate (per 1000 live births)	9.5	2003	14
1.1.1	Under-five mortality rate (per 1000 live births)	11.8	2003	14
1.1.1	Newborn infants weighing at least 2500g at birth (%)	90.80	2002	2
1.1.2	General economy: narrative report (separate sheet)			
1.1.2	Per capita GDP at current market prices (US\$)	12 823	2002	1,2
1.1.2	Total health expenditure on health as % of GDP	2.66	2001	3
1.1.3	Development priorities: narrative report (separate sheet)			
1.1.3	Land area for agriculture (as percentage of total land area)	3.2	2001	6
1.1.4	Human development index (Highest = 1)	0.87	2002	7
	Human development index Rank (out of 175 countries)	33	2002	7
1.2.1	Population with access to safe water (%)	99.00	2002	2
1.2.1	Population with adequate excreta disposal facilities (%)	80.00	2002	2
1.2.1	Solid waste collection (% of total waste generated)			
1.2.1	Proportion of urban population served by municipal solid waste collection (%)			
1.2.2	Proportion of urban population served by sewerage system (%)			
	National or major city			

	INDICATORS	DATA	Year	Source
1.2.1	Proportion of population with electricity (%)	100	2004est	11
1.2.3	Poison center service (Y/N list, year)	Y		
1.2.3	Chemical emergency preparedness (Y/N list, year)	Y		
1.2.4	Proportion of population living in informal settlements (%)	0		
1.2.4	Presence of building regulations and inspection (Y/N list, year)	Y		
1.2.5	Number of registered vehicles	244, 732	2003	1
	Rate (number per 100,000 population)			
	Number of registered motorcycles	7,628	2003	1
	Rate (number per 100,000 population)			
1.2.6	Presence of government/private laboratories and equipment for monitoring	Y; G		
	Drinking water (Y/N; G/P)	Y;G	2004	
	Water resources (Y/N ; G/P)	Y;G	2004	
	Ambient air (Y/N ; G/P)	Y;G	2004	
	Noise (Y/N ; G/P)	Y;G	2004	
	Radiation (Y/N ; G/P)	Y;G	2004	
1.2.7	Presence of government/private system for data collection and processing (Y/N; G/P)	Y; G		
1.3.1	Proportion of population using solid/biomass fuels for cooking or heating (%)	<10	2003	11
1.3.1	Proportion of vehicles using diesel (%)	35	2003est	1
1.3.1	Proportion of vehicles using unleaded gasoline (%)	65	2003est	1
1.3.1	Average number of times national air quality standards are exceeded in a year: a. short-term (1-hour average) frequency of exceedance b. long-term (8-hour average) frequency of exceedance	...		
1.3.2	Average number of times national water quality standards are exceeded in a year a. In three major rivers b. In major drinking water supplies	...		
1.3.2	Industries generating wastewater (number)			
1.3.3	Solid waste generated (kg/per capita/day)			
1.3.3	Solid waste generated (tons per year)			
1.3.3	Proportion of recyclable solid waste (%)			
1.3.4	Toxic and hazardous wastes generated (tons/year)			
1.3.4	Industries generating toxic and hazardous wastes (number)			
1.3.4	Health-care waste generation (tons per year)	195	2001	11
1.3.4	Nuclear waste generation (tons per year)	NR		
1.4.2	Cases of pesticide poisoning (number)	...		
1.4.2	Proportion of undernourished population (%)	...		

	INDICATORS		DATA	Year	Source	
1.4.2	Prevalence of underweight children under five years of age (%)		...			
1.4.4	Motor and other vehicle injuries (number)		549	2002	1, 12	
1.4.4	Road traffic crashes:					
	Number of accidents (within a year)		2, 838	2002	1, 12	
	Rate (Accident per 100,000 population)					
	Rate (Accident per 1000 vehicles)		12.1	2002	2	
	Rate (deaths per 100,000 population) # deaths		40	2002	1	
1.4.1- 1.4.7	Ten leading causes of inpatient morbidity		Number	Rate per 100 000 population		
	1. Asthma		1030	295.30	2003	14
	2. Pregnancy with abortive outcome		969	277.8	2003	14
	3. Acute upper respiratory infections		803	230.20	2003	14
	4. Fractures of specified and multiple body regions		738	211.60	2003	14
	5. Heart diseases		729	209.0	2003	14
	6. Non-inflammatory disorders of female genital tract		694	199.0	2003	14
	7. Maternal Diseases Classifiable but Complicating Pregnancy, Childbirth and The Puerperium		690	197.80	2003	14
	8. Anaemias		645	184.920	2003	14
	9. Gastroenteritis/Diarrhoea		630	180.62	2003	14
	10. Diabetes Mellitus		621	178.04	2003	14
1.4.1- 1.4.7	Ten leading causes of mortality		Number	Rate per 100 000 population		
	1. Heart diseases (including acute rheumatic fever)		213	61.10	2003	14
	2. Cancer		156	44.70	2003	14
	3. Diabetes mellitus		82	23.50	2003	14
	4. Cerebrovascular diseases		77	22.10	2003	14
	5. Bronchitis, chronic and unspecified emphysema and asthma		68	19.50	2003	14
	6. Influenza and Pneumonia		59	16.90	2003	14
	7. Hypertensive diseases		38	10.9	2003	14
	8. Certain conditions originating in the perinatal period		36	10.3	2003	14
	9. Transport accidents		26	7.5	2003	14

	INDICATORS		DATA	Year	Source
	10. Congenital malformations, deformations and chromosomal abnormalities	25	7.20	2003	14
	Notifiable Communicable Diseases	Number of cases	Number of deaths		
1.4.5	Tuberculosis (All types)	204	...	2003	14
1.4.5	Rheumatic fever and rheumatic heart diseases (Not notifiable in Brunei Darussalam)	15	4	2002	2
1.4.6	Acute respiratory infections (Not notifiable in Brunei Darussalam)	1616	41	2002	2
1.4.6	Hepatitis viral (including Hep A, B & C)	17		2003	14
1.4.6	Cholera	0	0	2003	14
1.4.6	Typhoid fever	13	0	2003	14
1.4.6	Encephalitis	1	0	2003	14
1.4.6	Diarrhoeal diseases (Notifiable in BD dysentery, Food poisoning, GE and Salmonella)	1214		2003	14
1.4.7	Plague	0	0	2003	14
1.4.7	Malaria	17	...	2003	14
1.4.7	Dengue/DHF	160	...	2003	14
	INDICATORS		DATA	Year	Source
2	Legal, Policy, and Institutional Structure				
2.1.1	National environmental health policy (Y/N list, year)		N		
2.1.1	National environmental policy (Y/N list, year) Environmental policy of Brunei: - to maintain sustainable utilization of natural resources; - to minimize negative impacts on environment arising from population growth and human activities; - balanced goals of socio-economic development and the need to sustain sound environmental quality.		Y		
2.1.1	Policies/legislation to reduce exposure to environmental tobacco smoke (Y/N list, year)		Y		
2.1.1	National policies for healthy settings (such as healthy cities) (Y/N list, year)		Y		
2.1.2	Environmental/Health Acts promulgated: (Y/N list, year) a. Water b. Air c. Solid Waste d. Toxic chemicals/Hazardous Waste e. Others - Petroleum Mining Act, amended 1992 (Chapter 44) - Forest Act (Chapter 46) - Water Supply Act (Chapter 121) - Poison Act (Chapter 114)		Y		4

	INDICATORS	DATA	Year	Source
	<ul style="list-style-type: none"> - Town and Country Planning (Development Control Act (Chapter 142) - Municipal Board Act (Chapter 57) - Ports Act, amended 1988 (Chapter 144) - Land Code (Chapter 40) - Agricultural Pest and Noxious Plants Act (Chapter 43) 			
2.1.2	Environmental impact assessment as an official requirement (Y/N list, year)	N		
2.1.2	Health impact assessment as part of EIA (Y/N list, year)	N		
2.1.3	Policies for decentralization such as for environmental health and monitoring (Y/N list, year)	N		
2.1.3	Policies for privatization such as for environmental health and monitoring (Y/N list, year)	N		
2.2.1	Organizational structure for environmental health (separate sheet) MOH and DOE			
2.2.2	List of agencies and partners for environmental health other than government (separate sheet)			
2.2.3	List of relevant government agencies and their functions (separate sheet as a table matrix) National Committee on the Environment (Chaired by the Minister of Development) Environment Unit, Ministry of Development	Y		4
2.3	Relevant international conventions/agreements (List, year signed/ratified) <ul style="list-style-type: none"> • Vienna Convention for the Protection of the Ozone Layer • Montreal Protocol on Substances that Deplete the Ozone Layer • Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) • Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal • Framework Convention on Climate Change • Convention on Biodiversity • Framework Convention on Tobacco Control 	Y		4
	INDICATORS	DATA	Year	Source
3	Human Resources Development Programs			
3.1	Environmental Health workforce			
	- environmental health officers (Known as Public Health Officer)	6	2004	15
	- health/sanitary inspectors (Known as Health Inspectors)	27	2004	15
	- assistant sanitarians (Known as Health Assistance)	17	2004	15
	- environmental officers	6	2004	10
	- sanitary engineers			
	- pollution control officers			

	INDICATORS	DATA	Year	Source
	- others			
3.2	Tertiary degrees related to environmental health (Y/N list)	N		
3.2	Short courses and duration related to environmental health (Y/N list)	N		
3.3	Government certification for environmental workforce (Y/N list)	N		
3.4	Professional associations related to environmental health (Y/N list, memberships)	N		
3.4	International associations' local affiliates (Y/N list, memberships)	N		
	INDICATORS	DATA	Year	Source
4	Priority Environmental Health Issues			
4.1	Soil erosion (mm/year)			
4.1	Fertilizer consumption (metric tons/year)			
4.1	Pesticide consumption (metric tons/year)			
4.1	Banned pesticides used (number)			
4.1	Water resources withdrawal for irrigation (annual withdrawal as percentage of total water resources)			
4.1	Irrigated agricultural area (1000 ha)	1	2001	6
4.2 -4.6	Inputs from Chapter 1			
4.6	Carbon dioxide emissions (per capita metric tons)	
4.6	Consumption of ozone-depleting CFCs (ODP metric tons)	93.32	2002	11

Notes:

- ... Data not available.
- p Preliminary / provisional
- NR Not relevant
- est estimate

Sources:

- 1 Statistical Yearbook 2003, Department of Economic Planning and Development (DEPD), Prime Minister's Office, Brunei Darussalam
- 2 Health Information Booklet 2002, Statistics Unit, Research and Development Section, Ministry of Health, Brunei Darussalam.
- 3 Ledger Section, Ministry of Finance-Expenditure, Brunei Darussalam
- 4 United Nations Environment Program, Regional Resource Center for the Asia and the Pacific - <http://www.rrcap.unep.org/>
- 5 Asian Development Bank Statistics - <http://www.adb.org/statistics/>
- 6 Food and Agriculture Organization Statistics - <http://apps.fao.org/default.jsp>
- 7 Human Development Report 2004, UNDP
- 8 Tuberculosis Cases 2002, data provided by Stop TB and Leprosy Unit, WHO Regional Office for the Western Pacific, 04 March 2004

- 9 Malaria and Dengue cases and deaths, data provided by Malaria, Vector-borne and Parasitic Diseases Unit, WHO Regional Office for the Western Pacific, 10 March 2004
- 10 2004 World Health Report - <http://www.who.int/whr/en/>
- 11 Information provided by the Department of Environment, Parks and Recreation, Ministry of Development, September 22, 2004
- 12 Royal Brunei Police Force, Prime Ministers' Office 2002
- 13 Borneo Bulletin, Brunei Yearbook : Key Information on Brunei 2004
- 14 Health Information Booklet 2003 (Draft), Statistics Unit, Research and Development Section, Ministry of Health, Brunei Darussalam
- 15 Information provided by the Environmental Health Services, Department of Health, Ministry of Health, October 2004.