

State of Commonwealth Environment



Edited by
Quamrul Islam Chowdhury

**STATE OF
COMMONWEALTH
ENVIRONMENT**

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C o n t e n t s

Prelude

1. **Australia**
 - Australia's response to climate change 1
By Murray Griffin
 - At a low ebb 15
Environmental journalism in Australian media
By Juliet Fox
2. **Bangladesh**
 - Exhausted environment 27
By Quamrul Islam Chowdhury
3. **Canada**
 - Environmentally alert Canada 53
4. **Fiji Islands**
 - Diversities of environment stories 69
By Nina Ratulele
5. **India**
 - Tortuous ties between activists and media 81
By Darryl D' Monte
 - Defying the desert 90
By Patralekha Chatterjee
 - Dying wetlands of Assam 95
By Nava Thakuria
6. **Kenya**
 - Time to recycle story 97
By Robert M Kihara
 - River water users unite in Kenya 110
By Michael K. Thomas
7. **Malaysia**
 - Win-win solutions key to 115
protecting environment
By Shahidul Islam Chowdhury with Teoh Teik Hoong
8. **Maldives**
 - Turtles at stake in Maldives 135
 - Coastal processes around a Maldivian island 142
By Thomas Le Berre
9. **Mauritius**
 - A new agenda in the media 145
By Soodhakur Ramallah

10. New Zealand		
	Environmental agenda on the top	157
11. Pakistan		
	Marshalling environment in the media	169
	<i>By Zaigham Khan</i>	
12. South Africa		
	Climatically sensitive	183
13. Sri Lanka		
	Sri Lankan environment	203
	Environment change on the rise	213
	<i>By Dharman Wickremaratne</i>	
14. United Kingdom		
	Climate change negotiation	217
	<i>By Graham Clough</i>	

Prelude

The conservation of the nature is a key to sustainable development. And since it represents a profound need of both organism and society, a crucial question is how that need can be met in a secure manner. This has thrown an unprecedented challenge of great magnitude and complexity to the natural resource management profession as well as the Commonwealth nations to whom belong Mother Earth.

To a Commonwealth whose membership reflects virtually the whole international community, the problems of the wider world are inevitably Commonwealth problems. The challenge of protecting the environment and promoting sustainable development constitutes a significant Commonwealth concern. Heads of Government in their 1989 Langkawi Declaration on Environment set out a comprehensive programme of collective and national action for the protection of the global environment and the achievement of sustainable development. The attendance of many Commonwealth leaders at the UN Conference on Environment and Development (UNCED) in Rio in June 1992 signalled the importance the Commonwealth attaches to the protection of global environment and the pursuit of sustainable development. Commonwealth personalities were very much to the fore in the UNCED process, including Canada's Mr Maurice Strong, who was the UNCED Secretary-General, and

Pro-green Bangladesh Prime Minister Khaleda Zia makes friends with a koala at a barbecue dinner for the heads of delegations and their spouses hosted by Australian Prime Minister John Howard and his wife Janette at the Commonwealth Heads of Government Meeting (CHOGM) in Coober



Singapore's Ambassador-at-large Professor Tommy Koh, who chaired the final Preparatory Committee meeting. Following a directive from Harare, the Commonwealth Secretariat was able to assist in promoting more effective consideration of the interests of small states in the processes leading up to UNCED by organising consultations among Commonwealth small states, and providing them with technical support at the preparatory meetings.



The impetus which UNCED provided to Commonwealth efforts in environmental cooperation is being continued through the new, ministerial-level Consultative Group on Environment which have constituted with the approval of Commonwealth governments.

This publication is the maiden attempt on the part of the Commonwealth Environmental Journalists Association (CEJA), since it was launched in 1998 in Sri Lanka, to take a cursory look at the state of Commonwealth countries. Frankly speaking, this is not based on any serious research work on the part of the newly born CEJA. Rather, this has been a compilation of articles, write-ups and reports mainly prepared by CEJA member journalists and experts.

We have also used materials of some water. Sometimes we have

reports from different international environment-related conferences and workshops. What we have done is just a compilation of all such environment-related write-ups, trying to piece together what we have called the State of Commonwealth Environment. In doing so, what we had in mind was to focus on today's environmental situation of some of the C'wealth member countries. While preparing this report we have noticed that some of the C'wealth countries have environment-friendly leaders like British Prime Minister Tony Blair and Bangladesh Prime Minister Khaleda Zia to take some tough decisions to avert environmental degradation. There might be many aspects that we could not touch -- mainly due to the constraints of materials and inputs as well as our own shortcomings like lack of expert knowledge, lack of coordination and organisational weaknesses. But despite all such lapses, we will feel encouraged if the readers find this publication useful in understanding at least some of the critical issues related to environment.

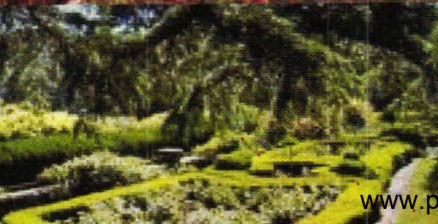
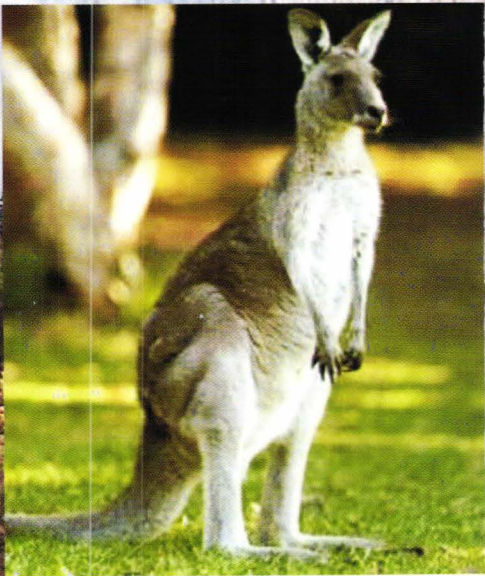


AUSTRALIA

Australia's response to climate change



State of Commonwealth Environment



Australia's response to climate change

By Murray Griffin

In 1997, at the Kyoto Protocol negotiations, Australia earned notoriety and widespread condemnation for winning the right to increase its emissions by 8% above its 1990 emission levels. The government justified the 8% target by arguing that it means Australia must make reductions below its predicted 'business-as-usual' emissions that are comparable to the cuts to be made by other nations (i.e. about a 30% reduction against current business-as-usual projections of emissions in 2008-12). Whatever the merits of this position, meeting the target of 108% will require significant action by Australia, in large part, because of a number of the proposed new energy-intensive projects, but also because of economic and population growth.

Up until recently, the government focused on voluntary 'no-regrets' initiatives to encourage emissions abatement. However, the government is now in the midst of introducing a range of mandatory measures to help it achieve the target. The most significant of these is likely to be a mandatory emissions trading scheme. The government has issued four discussion papers on this proposal over the past year and a decision on whether or not to proceed is expected in the next few months.

There have been many significant achievements in Australia, but significant policy challenges do remain. The country's failure to slow the rate of land clearing is the most important of these. The creation of a national electricity market is also proving a barrier to efforts to encourage the greater use of renewables. More generally, there has yet to be a broader public debate about how the country should respond to climate change that is essential in order to build the public

But the program has its limitations. Only slightly more than half (58%) of the organisations participating in it regarded it as having played an important role in stimulating abatement action, according to a 1999 survey.

consensus for change. In part, this is because public attention has been focused on an overhaul of the country's tax system which comes into effect on July 1. Disturbingly, but perhaps inevitably, the gradual broadening of the debate has led to the formation of a disruptive coalition of greenhouse sceptics, the Lavoisier Group - a group with a similar brief to the US-based Global Climate Coalition.

The policy response

The greenhouse challenge- Australia's first step:

Australia's first initiatives were programs to encourage the so-called 'no-regrets' voluntary measures by major emitters. The most significant of these was the Greenhouse Challenge program. Announced in 1995, the Greenhouse Challenge is a joint initiative of the Australian government and industry. Participating organisations voluntarily develop an agreement with the Australian government to measure and abate their greenhouse emissions, usually through measures to improve their energy and process efficiency. They must also report annually on their progress. So far, agreements have been made with more than 200 organisations. The program has recently entered a new phase of accountability, with progress reports of 32 of the largest emitters undergoing independent verification.

The Greenhouse Challenge program has been very successful in a number of ways. Many of Australia's biggest emitters - particularly in the aluminium, cement, power and coal mining sectors - are now signatories to the program. Participating in it has made these companies skill up on measuring and documenting their emissions and it has helped to make senior management take greenhouse issues seriously. Some significant abatement opportunities have also been identified by Greenhouse Challenge participants.

But the program has its limitations. Only slightly more than half (58%) of the organisations participating in it regarded it as having played an important role in stimulating abatement action, according to a 1999 survey.

Emissions trading:

If approved, the establishment of a national emissions trading scheme will be a cornerstone of efforts to reduce the country's greenhouse emissions. Under the proposed scheme, one permit

will allow a company to emit the equivalent of one tonne of CO₂. Each tonne of CO₂ emitted will mean another permit needs to be handed in to the Australian government for cancellation. Permits not used can be sold or kept for the years following the Kyoto Protocol's first commitment period. It is not yet clear whether permits will initially be auctioned or allocated to industry, or whether the scheme will commence with some combination of auctioning and allocation. The proposal for a trading scheme has received qualified support from industry and a decision about whether or not to implement it will be made by the Australian government in the next few months.

The 'greenhouse trigger':

The Australian Government has also proposed that its new environmental impact assessment legislation be amended so that projects emitting more than 0.5 million tonnes of CO₂ a year be required to comply with the assessment provisions of the legislation. This so-called 'greenhouse trigger' would not mean that such projects would be blocked. However, it would mean that backers of such projects would need to outline to the relevant authorities the steps they plan to take to abate their emissions and to ensure they are kept as low as possible.

Sustainable transport initiatives:

Taking action in this sector is particularly important for Australia. The country's transport sector accounts for 71 million tonnes of our total net greenhouse gas emissions, representing just over 17% of Australia's total emissions. About 87% of these emissions come from road transport. Greenhouse gas emissions from the transport sector are also the fastest growing emissions of any sector, rising by 15% from 1990 to 1996. The Bureau of Transport Economics projects that, without reduction measures, emissions from the transport sector will rise by 38% between 1990 and 2010.

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Initiatives to cut emissions from this sector include:

The Compressed Natural Gas (CNG) Infrastructure Program. It is designed to encourage the establishment of publicly accessible CNG refuelling stations.

The environmental strategy for the motor vehicle industry: Under this scheme, a fuel consumption label will be placed on the windscreen of all new cars sold in Australia. These model-specific labels will show each car's average fuel consumption. The Government is also negotiating with industry to set average fuel consumption targets for new passenger vehicles for 2005 and 2010. Fuel consumption targets for the Commonwealth government vehicle fleet are to be developed and will come into effect from 2003.

The alternative fuel conversion program and the alternative fuel grant scheme: The Alternative Fuel Conversion Program commenced in January 2000. Commercial on-road vehicles and buses weighing 3.5 tonnes or more are potentially eligible for grants under this program. It provides up to a 50% grant towards: the difference in the purchase price between new alternatively-fueled vehicles and conventionally-fueled equivalents; the cost of converting vehicles to CNG or LPG; the cost of upgrading the fuel systems of vehicles already operating on CNG or LPG where a reduction of greenhouse gas emissions can be demonstrated.

The Alternative Fuel Grant Scheme aims to maintain the current price relativities between diesel and alternative transport fuels by allowing on-road transport operators who would be eligible for a diesel fuel grant if they used diesel to also be eligible for a grant if they use alternative fuel.

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Sinks:

This issue is a matter of tremendous significance to Australia, a country where land use change and forestry have a great impact on our greenhouse emissions profile. Australia is keen to encourage overseas companies in other developed countries to invest in sinks

projects here. As well as bringing revenue into Australia, these projects potentially help an overseas investing company to offset its greenhouse emissions. In February, Japanese power giant TEPCO and the state government of New South Wales finalised a ten-year carbon sink deal for the planting of up to 40,000 hectares of forest. The first year's planting will start immediately. Australia is also strongly urging that sinks projects be permitted under the Clean Development Mechanism, the key Kyoto Protocol mechanism for co-operative projects between developed and developing countries.

Cities for Climate Protection is an international program that encourages local governments to take action on greenhouse. Australian councils constitute almost one quarter of global signatories to this program.

Cities for climate protection:

Cities for Climate Protection is an international program that encourages local governments to take action on greenhouse. Australian councils constitute almost one quarter of global signatories to this program. Cities for Climate Protection provides local governments with a framework to reduce greenhouse gas emissions by assisting them to: identify and quantify the emissions of their council and community; set a reduction target; and develop and implement an action plan to reach their target.

The 2% renewables target:

This scheme aims to increase the contribution of renewable energy sources in Australia's electricity mix from approximately 10.7 % in 1997 to approximately 12.7% by 2010. It effectively means sourcing an additional 9,500GWh of renewable energy by 2010, with a number of interim targets specified up until that date. Legislation to give effect to the scheme will be introduced shortly. All wholesale buyers of power on grids of more than 100MW capacity will be required to acquire renewable energy certificates from 2001 to help meet the 2% renewables target. Certificates can be acquired by purchasing renewable energy and the associated certificates, or by purchasing the certificates from an organisation which has either already acquired them or has created them by generating renewable energy.

Other renewable energy initiatives:

Other initiatives to support and develop the use of renewable energy include the following:

Green power schemes:

Green power schemes - under which businesses and households can volunteer to pay a higher tariff for electricity in order to fund the purchase of renewable power by their electricity provider - are now operating in every Australian state.

The renewable remote power generation program:

The Renewable Remote Power Generation Program will provide support for conversion of diesel-based electricity supplies to renewable energy technologies.

Renewable energy is often a viable alternative to diesel-generated electricity in those areas of Australia not serviced by a main electricity grid. The Renewable Remote Power Generation Program will provide support for conversion of diesel-based electricity supplies to renewable energy technologies. The program will commence in July 2000 and will be funded from excise paid on diesel used to generate electricity.

Photovoltaic rebate program:

Under the Photovoltaic Rebate Program, cash rebates are available to householders who install grid-connected or stand-alone photovoltaic systems. The scheme will be expanded from 1 July 2000 to provide rebates to owners of community-use buildings, such as schools.

Renewable energy commercialisation program:

This program provides funding for the development and commercialisation of renewable energy technologies and services.

Greenhouse gas abatement program:

Last year, Prime Minister John Howard - under pressure from the minor party that holds the balance of power in the Australian Senate - announced a \$400 million Greenhouse Gas Abatement Program. The program will fund several major projects which have the capacity to have major and long-lasting carbon reduction or sink enhancement benefits. The program will be progressively implemented from July 2000.

Remaining challenges

Land clearing:

The great failure in policy making to date has been in the response to land-clearing. This might seem surprising, because reducing land-clearing has the potential to reduce not only greenhouse emissions but to prevent other key environmental challenges facing the country - salinity and biodiversity loss. However, politicians who seek to impose controls on land-clearing risk getting off-side with Australia's rural electorates - and it is these electorates that may well determine which party wins the next national election. Some progress has been made in reducing the rate of land-clearing, but it remains a key policy concern.

The national electricity market:

In the United Kingdom, privatisation of the electricity market led to a 'dash for gas' and a significant reduction in the amount of electricity generated from coal. But the privatisation of most of Australia's power providers and the creation of a national electricity market has not had the same effect. Another 30,000MW of coal-fired generating capacity has been approved by state governments since the national electricity market commenced a few years ago.

Building social consensus for action:

At a recent forum in Melbourne, the head of BP-Amoco in Australia, Greg Bourne, told business to "stop bleating and get on with [abatment]". The Business Council of Australia recently issued a set of greenhouse policy principles which cautiously but explicitly accepted that measures other than 'no-regrets' measures were required. Business is also concerned that company directors could be liable if they fail to prepare their companies for the greenhouse economy.

The great failure in policy making to date has been in the response to land-clearing. This might seem surprising, because reducing land-clearing has the potential to reduce not only greenhouse emissions but to prevent other key environmental challenges facing the country - salinity and biodiversity loss.

In November last year the Australian Gas Association (AGA) left the Australian Industry Greenhouse Network (AIGN), a lobby group formed by energy intensive industry to campaign

In common with other developed countries, some industry groups are encouraging a fear that the Kyoto protocol will mean developing countries will gain an unfair advantage, with big energy-intensive projects moving to countries that do not have Kyoto targets.

against mandatory greenhouse controls. "Being closely associated with the AIGN is becoming more of a barrier to getting our positive message across," according to the AGA's Bill Nagle.

These are all welcome and significant signs of an emerging social consensus on the need to take action on human-induced climate change. But there are problems. Business and government have been distracted by a complete overhaul of Australia's tax system which came into force on July 1 of this year. The government's likely decision to

introduce a form of mandatory emissions trading - a decision likely to come down in a couple of months time - may well trigger howls of protest from many parts of the business sector.

In common with other developed countries, some industry groups are encouraging a fear that the Kyoto protocol will mean developing countries will gain an unfair advantage, with big energy-intensive projects moving to countries that do not have Kyoto targets. This argument must seem laughable to developing and emerging economies facing the impacts of a problem largely not of their own making. But it has been particularly potent in Australia, because of our dependence on such projects.

Disturbingly, a new lobby group has recently been established in Australia in an attempt to derail Australia's efforts to deal seriously with climate change. The 'Lavoisier Group' is very well-connected in politics and business and may prove very disruptive over the coming months.

Where are we now?

The senate inquiry:

Australia's response on human-induced climate change is currently the subject of a review by a Senate committee. (Australia's Coalition government does not have control of the Senate, and although it is represented on the committee, it does not have majority membership).

Earlier this year, the committee was presented with a disturbing update on climate change science by key contributors to the third assessment report currently being prepared by the Intergovernmental Panel on Climate Change (IPCC). Professor John Zillman of the Bureau of Meteorology told the Senate committee that the evidence for sustained global warming over the past century, particularly since 1945, is stronger than at the time of the second IPCC report. "Furthermore, it now appears that, on the basis of more rigorous and comprehensive statistical techniques, human activity may account for a substantial fraction of the observed global temperature increase during the 20th century."

In his presentation to the Senate committee hearings, Dr Robert Watson, chairman of the IPCC, said: "a sustained increase in temperature of, say, two to four degrees centigrade could lead to a significant adverse effect on coral reefs around the world. The forests of the world could also be quite severely impacted. In the second assessment report we actually said that probably one-third of all forest trees species would no longer be viable in a double CO₂ world - probably 1/7th in the tropics and as much as 2/3rds in the boreal region - and the latest predictions bear that out well." Watson described the Kyoto Protocol as "only a small, albeit very important, first step" if we want to stabilise atmospheric concentrations of CO₂.

Perhaps most disturbing of all was the evidence given to the Senate committee by Dr Geoff Jenkins, director of the UK Met Office's Hadley Centre for Climate Prediction and Research. Dr Jenkins told the committee that: "a sea level rise of half a metre over the next 100 years is something that most climate modellers could sign up to". But he warned that sea level rise would continue long after CO₂ levels are stabilised because of slow penetration of

"A sustained increase in temperature of, say, two to four degrees centigrade could lead to a significant adverse effect on coral reefs around the world. The forests of the world could also be quite severely impacted. In the second assessment report we actually said that probably one-third of all forest trees species would no longer be viable in a double CO₂ world - probably 1/7th in the tropics and as much as 2/3rds in the boreal region - and the latest predictions bear that out well."

thermal heating to the deeper layers of the ocean. "If you are an island nation, you may say that you could avoid damage over the next 100 years but even if drastic reductions were made in greenhouse gas emissions you have still got to be content with an ongoing sea level rise that would carry on for hundreds of years even after stabilisation of climate and CO₂."

Emissions:

The latest national inventory is based on 1997 data. It shows greenhouse gas emissions per dollar of GDP have fallen by nearly 9% between 1990 and 1997. However, the trend is one of the few bright spots in a generally bleak report card on Australia's efforts to abate emissions. Net emissions in 1997 were 11% above 1990 levels according to the national greenhouse gas inventory figures.

There is no doubt that the measures already in place will have a significant impact on Australia's emissions of greenhouse gases. But more will have to be done. A clearer picture of the challenge that remains will emerge in a month or so with the release of a comprehensive and up to date report on Australia's greenhouse emissions profile by the Australian Greenhouse Office. This report will be the first in Australia to incorporate

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figures associated with land use change and forestry. However, determining with much precision how much more needs to be done at a domestic level will not be possible until the rules governing the Clean Development Mechanism, trading and sinks are clarified in international negotiations.

In the five years that I have been writing about environmental issues in Australia, I have seen a dramatic shift in the seriousness with which business, government and Australian society generally, view greenhouse issues. There has been a shift from a tokenistic approach to a recognition that this is an issue of national and global importance and serious effort to work out how to implement an appropriate response.

Perhaps the most telling sign of this is the comment by environment minister, Senator Robert Hill, that with greenhouse spending now at about \$1 billion, on a per capita basis Australia is spending more public money on climate change than any other country in the world.

Furthermore the broadening of the debate on greenhouse issues in Australia - necessary to build the social consensus for the significant changes we must make - is starting to happen. Unfortunately, with few exceptions, media coverage of the issue has been rather poor. To some extent, this is understandable. It is such a hard debate. The timeframes are so long. The issue must be debated on so many different levels - moral, scientific, economic, personal, national and global.

Journalism has a key role to play in reporting on the debate in the months and years ahead. The key challenges we face are to provide the factual and contextual information necessary for constructive debate on these many levels.

Drowning in a dry landscape

Appreciating how water flows through and under our landscapes is crucial to understanding why some of our major environmental issues will take decades to solve or stabilise.

Crops and pastures have replaced native vegetation in many areas. They have shallow root systems that do not use nearly as much of the rain and the irrigation water that percolates into the soil as do native plants and trees.

Rain or irrigation water that is not taken up by plants or trees either finds its way slowly to the water table (groundwater) or moves laterally underground to adjacent streams. Because crops and pastures use less water, the excess water finds its way to the groundwater up to 10 times faster.

Consequently, groundwater levels slowly rise, and in so doing dissolve the natural salt in the weathered soils found over vast areas of Australia.

It can take from 10 to 100 years for these changes to bring salt to the land surface or to the streams. The nature of the landscape, the depth of groundwater, the amount of rainfall and irrigation and the amount of a catchment that is cleared influence the time for salt to become apparent.

Halting or reversing the rise of groundwater requires farming systems with similar water use outcomes to those of vegetated landscapes with deep-rooted plants and trees. Such changes are complex and we are still looking for the appropriate mix of land uses in the many land systems that exist in Australia. What is certain is that such systems of water balance at a catchment and subcatchment scale are essential if salinity is to be managed.

Even when changes to land use like this are made, it will take many decades or even centuries to reverse the rise in groundwater levels and improve the water balance.

At a low Ebb

Environmental journalism in Australian media

By Juliet Fox

Coverage of environmental issues in the Australian mainstream media is largely recognized as having started in the early 1970s. The issues of the early 70s included so-called 'Green Bans' in New South Wales (NSW), where the community, led by building workers from the NSW Builders Laborers Federation (BLF), took action to stop environmentally destructive urban development, and to save remnant bushland. The action was widely successful, and the Green Bans are attributed to the origins of the term 'greens'. It was also during the 1970s in Australia that the first green political party was formed in the island state of Tasmania (the United Tasmanian Group of 1972-76).

Environmental reporting is seen to have reached its peak in the late 1980s and early 90s, due largely to the environmental activism and political conflicts of the time. Key issues of this period included the logging and woodchipping of native forests, the depletion of fauna and flora biodiversity, and the pollution of water and air. It was during this time that 'environment' also became a media theme in its own right, and traditionally non-environment issues were covered from an 'environment angle' -- for example, Aboriginal land rights, mining concerns and Australia's bid for the 'green' Olympics.

Environmental reporting is seen to have reached its peak in the late 1980s and early 90s, due largely to the environmental activism and political conflicts of the time. Key issues of this period included the logging and woodchipping of native forests, the depletion of fauna and flora biodiversity, and the pollution of water and air.

Overview of the Australian media

There are three branches of media in Australia - there are the government broadcasters, the commercial sector and the public and community sector.

Government broadcasters include the Australian Broadcasting Corporation or the ABC, and the Special Broadcasting Services

or SBS. The ABC has a national television service and nine metropolitan radio stations, 49 regional radio stations and 4 national radio networks, including Radio National, Classic FM., Triple J and the Parliamentary and News Network). SBS also has a national television service and 2 radio stations, one in Sydney and one in Melbourne, and one national network.

The commercial sector has some 217 radio stations - 42 in metropolitan areas and 175 in regional areas - over 100 suburban newspapers and around 13 capital city or national daily newspapers. There are just 3 metropolitan Commercial television stations and numerous regional ones. The commercial sector by far makes up the bulk of media outlets overall in Australia.

The government and commercial sectors are defined as making up the mainstream media in Australia.

Then there's the public and community sector, which has around 130 radio stations around the country and one national distribution service. While community television is currently being developed There are presently no community television license holders in Australia, however, there is the potential for current temporary license holders to be granted community television licenses come June of next year.

From the array of available newsletters and magazines, there are none that I would classify as journals dedicated to in depth, researched and independent environmental reporting. Disappointing, to say the least, for a population of over 19 million living in an incredibly rich, diverse and above all unique natural environment.

Environment Reporting in the mainstream Australian media;

Print media

Looking firstly at the mainstream print media, Australia has around 12 environment newspaper reporters or editors, representing daily newspapers - including the national daily 'The Australian' - in every state and territory, except for the Northern Territory. While these reporters are allocated with the 'environment' round, that neither means a story would necessarily appear from them every day, nor would it mean that the story itself came with any kind of sound environmental message.

The print media has some 22 specialist

environment magazines, but of these, 8 are from specific environment groups and the rest are environment or industry based. There are also some 17 newsletters, but again the majority of these are government or business based with the rest coming from specific conservation organizations. From the array of available newsletters and magazines, there are none that I would classify as journals dedicated to in depth, researched and independent environmental reporting.

Disappointing, to say the least, for a population of over 19 million living in an incredibly rich, diverse and above all unique natural environment.

Similarly, the early 1990s is the time attributed to the 'fall' in environmental reporting in Australia and this has causal effect to a drop in the population's belief that the Australian environment has deteriorated.

Television media

In the area of mainstream television there are as yet no regular programs that I'm aware of specifically dedicated to environmental concerns. There are frequently natural history series, and occasionally environment-focused documentaries on prime time commercial television. Environment stories also appear on regular science based television programs and generalist news and current affairs shows on all stations. However, the focus and angle is of necessity substantially different than if it were a program dedicated purely to environment issues.

Radio media

On mainstream radio there is only one environment program that I know of dedicated to environment issues albeit often from a scientific perspective. 'Earthbeat' is broadcast at the convenient time of 7:30 to 8 on a Saturday morning, a timeslot that reflects the level of prioritization and importance given to dedicated environmental concerns. The show manages to attract an average listenership of just over 50,000 per week.

Environmental reporting and public concerns

The Australian mass media play a key role in disseminating information on environment problems and contribute to the creation of public concerns. While not telling people what to think, the media does shape what people think about and

While media coverage is certainly not the deciding factor in determining whether the community is concerned about environmental issues, it certainly is a key element.

through what types of frameworks they think. Consequently, a correlation can be drawn between levels of media coverage on environment issues and the population's concern about those issues. As a University of Tasmania publication on this issue states:

It would be rather extraordinary given the saturation of (advanced) societies by print and electronic media, if there were not some close relationship between

media coverage of an issue and public opinion on that issue.

The media performs an agenda-setting role. This can be seen in a study of environmental print media coverage (involving four major Saturday newspapers in different cities) and environmental public concerns in 1989. Print media coverage of environmental issues hit an all time high in 1989 and this corresponded to an all time high in popular concern about the environment. In addition, the most frequently reported on environment issues in 1993 were water and air pollution, and concerns about toxic waste. 1994 Australian Bureau of Statistics show that air pollution followed by ocean pollution were the top two environmental concerns of the time.

Similarly, the early 1990s is the time attributed to the 'fall' in environmental reporting in Australia and this has causal effect to a drop in the population's belief that the Australian environment has deteriorated. The percentage of respondents indicating a belief that the Australian environment had deteriorated dropped from 50% in 1991 to 43% in 1993 - some 38% of respondents in 1991 indicated that the Australian environment had improved, in 1993 this rose to 46%.

The report states that:

We can assert with a fair degree of certainty that press coverage played a critical active role in the rising spiral of attention to the environment, a role that cannot be glossed as a mere 'reflection' of other events.

While media coverage is certainly not the deciding factor in determining whether the community is concerned about environmental issues, it certainly is a key element.

Current state of environment reporting

The, environment is seen to have reached its peak in the Australian mainstream media nearly ten years ago, and now it continues to slip off the agenda. The above mentioned study also illustrates the decrease in environment reporting. It shows that in 1989 in the Melbourne Saturday Age there were 227 environment stories with 9 appearing on the front page, and in the Sydney Morning Herald there were 294 with 19 appearing on the front page. By 1993 this had dropped to 111 in the Melbourne paper with 3 on the front page, and 173 in the Sydney paper with 8 appearing on the front page. Since then there have been rises and falls in environment reporting with an overall continuing decline.

Reasons for this current situation include the decline in the Australia economy, during which the public focus on the problems of unemployment, crime, education and health above the environment. Government action, or inaction, on the environment is another reason. Governments around Australia are a major source of mainstream media environment stories--be it through the release of reports, debate, or decision-making. According to initial findings of a current PhD study it seems that there has been a conscious decision to limit this type of coverage by governments themselves. Interestingly, the ability of environment groups to organize effectively and understand the machinations of the media industry is also seen to be a reason for a decrease in environment issues in the media.

Both Australia's Prime Minister, John Howard and Environment Minister, Senator Robert Hill, say that nowadays, "everyone is an environmentalist". Howard and Hill are instrumental in Australia securing a net increase in Greenhouse gas emissions, and pushing through with uranium mining at Jabiluka, against the wishes of the traditional owners and to the potential detriment of a World Heritage area. Such statements are symptomatic of the virtual hijacking of environmental issues by conservative movements.

Environment reporting in Australia has become 'routine' that is, it has become a matter of everyday business absent of any urgent or intense media coverage. This 'routinisation' is combined with a reduction in intensity of public concern and political debate.

In conclusion, environments journalism is presently at a low in Australia, due to economic decline, conservative governments and the 'mainstreaming' of environment concerns.

Environment concerns have been 'mainstreamed', with all major political parties having incorporated environment issues into their party platform. Environment organizations no longer have 'ownership' or exclusive representation' of environment issue's and this has led to a marginalization of environment groups, and a change in the sort of environment issues covered

by the mainstream media.

Environment reporting in Australia has become 'routine' that is, it has become a matter of everyday business absent of any urgent or intense media coverage. This 'routinisation' is combined with a reduction in intensity of public concern and political debate.

There has been the so-called 'scientisation' of environmental issues; that is, environment problems are increasingly discussed in the context of scientific debates, considerations and findings. Similarly, solutions to environmental problems are increasingly covered as 'technological rather 'political' in nature, to be solved by expert and bureaucrate, rather than ideological political shifts. This has a profound effect on the recognition of the social importance and impact that environment issues have. Again, this has pushed many environment groups to the outer and made them just one source amongst many when it comes to environment stories. this has been accompanied by close scrutiny of environment groups' scientific and technical credentials rather than political intentions.

Where is environmental journalism in Australia heading?

In conclusion, environments journalism is presently at a low in Australia, due to economic decline, conservative governments and the 'mainstreaming' of environment concerns. What is of particular concern is that the level of media attention given to environment concerns appears to have a direct affect on the public's concerns on those issues.

On a positive note, a major Tasmanian institution has recognized the importance of environmental concerns. An environmental journalism course has been set up at the University of Tasmania in Hobart -- this is the first of its kind

in Australia. The outline of the course, which will start next year, is:

Students explore the current issues and the key players in the environment movement from the perspective of the working journalist. The unit includes sources of news; case studies of stories on the environment; analysis of the political and legal background of environmental concerns in Australia and international trend in industry and governmental response to environmental issues.

Hopefully courses such as this one, and the ongoing work by a wide variety of environment groups around Australia, will challenge the current media paradigm and its level of importance attributed to environment concerns. It is vital for people and the planet that environment issues secure a prominent and firm place on the media's agenda in Australia immediately.

Mining land rehabilitation in Australia

The Australian government has taken a lot of interest in rehabilitating mined lands and has encouraged such initiatives by the private sector. Nabarlek Uranium mining project is a case in point. Uranium was mined from the Nabarlek ore body in a single 143-day campaign during the dry season of 1979. It was stockpiled on a specially prepared site while the mill was constructed. The ore was processed in the mill over the subsequent 10-year period. The rehabilitation aspect of the area after mining and processing of Uranium was an important component of the project from its very inception. It was for the same reason that topsoil from the mine and mill construction was placed in a stockpile and allowed to stand until required in the final rehabilitation. Tailings from the milling operation were returned directly to the mined out pit. The waste rock was placed to the south of the site and planted with an exotic grass species to provide erosion control. During the mine planning process, the final decommissioning and rehabilitation programme was developed as a series of specific component plans including an earthmoving and revegetation document. Throughout the life of the mine, these components were reviewed at intervals and updated to take account of changes in mine development as well as incorporating the results of site-specific research and new technology.

During preparation for final decommissioning, the site topsoil dump was investigated. It was found that, due to its 10 years in store, the material was of little value to the rehabilitation process. The soil had lost much of its micro flora and faunal populations, it had been leached of nutrients and had become a source of weed seeds. Few viable propagules of potentially "useful" plants had survived. Therefore the topsoil was used in the rehabilitation work but not as a final cover as this would have spread undesirable weeds across the site. The waste rock dump had been unattended during the life of the mine and had become well vegetated with a wide range of native species of trees and shrubs. This material was selected for the final cover for reshaped and rehabilitated landforms. The rehabilitation

objective, as agreed with the traditional owners and the supervising authorities, was to establish a landscape that matched the surrounding areas as closely as possible and would permit traditional hunting and gathering activities to be pursued.

The earthmoving plan placed all mine wastes in the mined out pit together with scrap metal etc. This was then covered with a layer of waste rock up to 15 metres thick and the final landform left as a mound over the pit to allow for subsidence and to still provide a water shedding cover. The original cover design was of great importance as it was required to act as a barrier to radon gas and to contain the tailings and radioactive waste for thousands of years.

Earthmoving for the final landform shaping was carried out during the dry season of 1995. Apart from demolishing earthworks, including substantial pond walls, the work also required the land surface over most of the site to be returned to approximately its original contours. The ponds were filled in and the waste rock was spread and incorporated the degraded topsoil lower down the soil profile.

One concern while completing the rehabilitation earthworks was the amount of compaction caused over the site as a result of the constant passage of trucks and other mobile plant. At the end of earthmoving, therefore, a large bulldozer fitted with a winged deep ripping tyne was used to rip the whole site to loosen the surface and provide improved conditions for seed germination. During this operation some oversize rocks were brought to the surface, which were collected into piles and spread randomly across the site to provide refuges for small animals and reptiles that were anticipated would re-colonize the site.

The fine domed cover over the pit was designed following research and shaped to provide shorter runoff paths and so reduce runoff water velocities. A single, low, central ridge was established to facilitate these shorter flow paths. Seeding was carried out at the end of earthmoving, immediately before the onset of the monsoon rains of the 1995-96 wet season as previous work on site had shown that this was likely to be the most successful revegetation approach. The

rehabilitation of the site is progressing well and continued monitoring is in place to establish when the site can be returned to the traditional owners.

Nabarlek story is unique and offers practical towards planning and executing the rehabilitation process of mined lands.

Australia clamps down on sea pollution

Australia's National Plan to Combat Pollution of the Sea by Oil is managed by the Australian Maritime Safety Authority (AMSA) and funded by a levy on the shipping industry. The National Plan is a collaborative arrangement between AMSA, the States and Northern Territory governments, the shipping, oil and exploration industries and the Australian Marine Oil Spill Centre, at Corio Quay, Victoria. The Centre was established by the oil industry to assist in responding to major oil spills around the Australian coast and in adjacent areas where Australian-based companies operate.

Under the Plan, pollution-response equipment is stockpiled at strategic ports and oil terminals, with a response capability for an oil spill of up to 10000 tonnes. Whilst fully laden tankers typically carry 60000 tonnes of oil, the result of most collisions is the rupturing of only one or two internal tanks, such that any oil spill is typically much less than the tankers fully laden capacity. The Kirki oil spill, for example, happened over a two-week period. If a spill larger than 10000 tonnes occurs, Australia may need to seek international assistance through arrangements under the international Oil Pollution Response and Cooperation Convention. Australia has concluded a memorandum of understanding with New Zealand under this Convention, by which assistance will be provided to each other in cases of pollution incidents in either country. Similar agreements are currently being negotiated with Papua New Guinea and Indonesia.

Australia has been at the forefront of regional initiatives to protect the marine environment through the regulation of international navigation. In 1990, the Great Barrier Reef was the first area in the world designated as a 'Particularly Sensitive Area' by the International Maritime Organization requiring all vessels of more than 70 metres in length or those carrying oil, chemicals or liquefied gas to carry Australian-licensed pilots when using the designated routes within the Great Barrier Reef Marine Park (Zann 1995). In support of these two specific initiatives, Australia is currently upgrading existing navigational aids and charts and establishing protocols for the management of ship passages through the Torres Strait and the Great Barrier Reef areas.



BANGLADESH

Exhausted environment



State of Commonwealth Environment



Exhausted environment

By Quamrul Islam Chowdhury

Despite a rising awareness about the needs for protecting the environment, environmental degradation already cut a swathe through Bangladesh quite fast during the last three decades (1971-2001). The country's ecology has been damaged, the forests have been depleted, the wetlands destroyed, different species of flora and fauna have vanished, wildlife has almost disappeared, bio-diversity has been greatly reduced and the air quality deteriorated. And even if drastic measures are taken to halt the deteriorating trend, it is difficult to visualise an optimistic scenario for the country over the next 30 years (2001-2030).

Of late though, since June 2001 to be precise, some positive steps started to be taken to arrest such deterioration in the environment sector. In mid-June 2001, a caretaker government that took charge for a three-month stint addressed some of the burning environmental issues. Despite their short tenure, they took up the issue of the river Buriganga, applying their authority to evict encroachers from large tracts of land along the moribund river that was once the lifeline of capital Dhaka. The caretakers also tried to address the problem of inland marine pollution as well as the wanton encroachments on the lakes within Dhaka city, viz. Gulshan and Dhanmandi lakes. Some steps were also taken to stop an attempt by some private and political quarters to grab parts of the Usmany Uddyan -- a green patch of land with trees -- in the heart of Dhaka city to build a hotel. The caretakers further tried to discipline the city's chaotic traffic and curb air pollution.

As a matter of fact, for the years ahead, the country is braced for a series of serious environmental problems like climate change, sea level rise, depleting groundwater table, the persisting menace of arsenic contamination of groundwater, deteriorating water and air quality, alarming level of soil degradation, etc.

But as soon as a new government was elected in October, 2001, it took up the green agenda. The new cabinet of Prime Minister Khaleda Zia took a momentous decision of banning Polythene shopping bags from the country. It also decided to ban old and dilapidated vehicles belching out deadly black smoke from the city streets. A 100-day programme announced by the prime minister also included emergency arsenic mitigation schemes. Besides, the Ministry of Environment and Forest went about addressing such problems like hill cutting, theft of trees in the reserve forest and unauthorised mushrooming of brickfields in and around the country's major cities. But although the decision has been taken to set up environmental courts, those were yet to be put in place.

As a matter of fact, for the years ahead, the country is braced for a series of serious environmental problems like climate change, sea level rise, depleting groundwater table, the persisting menace of arsenic contamination of groundwater, deteriorating water and air quality, alarming level of soil degradation, etc. These are just to mention a few of the environmental problems looming large over this over-populated and impoverished nation. It is high time that we take up environmental issues in right earnest and put them high on the national agenda for action to halt environmental degradation. That is an imperative for ensuring a sustainable future for our nation.

Bangladesh is a land-hungry country with a large population. Tucked away in the northeastern part of the South Asian

Even with a steady decline in fertility, due largely to accelerated efforts in population control, the country's population is expected to reach 170 million -- with the density increasing to 1200 people per square kilometre -- by the year 2010.

subcontinent, it abuts on India on its western, northern and eastern sides and borders upon Myanmar (Burma) on the southeastern tip. Its seaboard is in the south on the Bay of Bengal.

At the current annual growth rate of 2.17 per cent (Bangladesh Bureau of Statistics, 1997), the estimated population in 1998 was about 126.5 million. The total area of the country is 147,570 square kilometres, 6.7 per cent of which is rivers and inland water-bodies. The population density, therefore, is about

900 persons per square kilometres -- one of the highest in the world.

Even with a steady decline in fertility, due largely to accelerated efforts in population control, the country's population is expected to reach 170 million -- with the density increasing to 1200 people per square kilometre -- by the year 2010. The official target, however, is to attain a replacement fertility rate by 2010, and in such case, the population is expected to reach a steady state at 250 million towards the end of the next century (World Bank, 1998). The predominant concern for the country's environmental sustainability is to achieve this target and ensure a reasonable livelihood for over twice the size of the present population.

Bangladesh is also a disaster-prone country, the geographical setting and various other anthropogenic activities make the country vulnerable to natural disasters. Almost every year one or more severe natural disasters upset people's lives in some part of the country. Flood is a recurring phenomenon in the country, which brings untold sufferings to millions of people, and results in human deaths, loss of livestock, spread of diseases and hunger, damaged standing crops, destroyed physical and economic infrastructures, damaged fish and shrimp ponds and hatcheries, etc.

Cyclone and storm surges occur frequently and cause significant destruction in the coastal areas of the country. Nor'westers and tornadoes also frequently hit different places of Bangladesh. Tropical cyclones and tornadoes have serious and adverse impacts on the economy, as well as on the whole environment, they uproot trees, telephone, telegraph and electricity lines, destroy bridges, culverts and houses, kill people and domestic animals.

Although this country with a monsoon climate usually has enough rain, but often droughts make a negative impact on the agriculture and economy of Bangladesh. The northwestern part of the country is vulnerable to drought. Disastrous land erosion events mainly take place along the banks of the major river systems of the country. i.e., the Brahmaputra-

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Now, whether it is the socio-economic life of northwestern Bangladesh or the coastline, whether it is agricultural bases or power of cyclones, whether it is global warming or terror of tornadoes, Bangladesh is environmentally vulnerable and the nation should take a defensive action plan to avoid a catastrophe.

Jamuna, the Ganges-Padma, the Lower Meghna, and other rivers.

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Vulnerable to any degree of sea-level rise, the major parts of Bangladesh are deltaic in origin. The terrain is largely flat and the relief is low. Nearly 50 per cent of the country has an elevation of less than 10 metres above sea level. Only in the southeastern parts of the country does

the altitude exceed 300 metres.

Large areas within the country have been uplifted geologically in recent times while some areas are still subsiding. It is postulated that these movements may be due to the presence of a major fault (Alam et al, 1990) that connects Calcutta (West Bengal, India) and Mymensingh in north-central Bangladesh.

The Tropic of Cancer passes through the centre of Bangladesh and the climate can be described as tropical monsoon type -- warm and humid in the summer, dry and cool in the winter. Three meteorological seasons are identified, which also coincide with the three main cropping seasons.

The meteorological seasons are summer (March-May), monsoon (June-October), and winter (November-February). Maximum temperature in the summer exceeds 38.C, and is characterised by thunderstorms (locally known as nor'westers) as well as high evaporation rates. The monsoon or the rainy season experiences more than 80 per cent of the total annual rainfall.

The winter season receives less than five percent of the total rainfall, and is characterised by low temperature (often reaching below 10 degrees C in the north), low humidity and high solar radiation. Temperature in Bangladesh varies between 10 degrees

C and 40 degrees C. It peaks during April and the minimum is recorded in January. The critical aspects of rainfall in relation to the use of land for agriculture are the uncertainty of the onset and departure of the monsoon as well as the total amount of rain in a year.

Land Ecosystem: Bangladesh has three broad types of landscapes: floodplains, terraces and hills. Floodplains are composed of recent alluvial deposits and occupy 80 per cent of the total area of the country. The terraces (slightly uplifted fault blocks), occupying about eight per cent of the area, include the Madhupur tracts in the centre and the Barind tracts in the north-east.

The hills occupy the remaining 12 per cent of the area in the southeastern Chittagong Hill Tracts (CHT) and northeastern Sylhet districts. The three broad types of landscapes can be divided into 20 physiographic units (FAO, 1998), each with its own characteristics of land capability and land use.

Although a small country, Bangladesh has a wide range of soils. About 500 soil series have been identified, but these can be grouped into three categories, conforming to the three major landscape types of the floodplains, terraces and the hills. Soil erosion is a serious problem in Bangladesh.

Heavy rainfall, steep slopes of hills and terraces and year-round tillage contribute to continuous erosion of the topsoil. Lack of comprehensive soil conservation practices and increasing pressure of population on land are major constraints in combating the land degradation process.

Agricultural land is the most basic resource in Bangladesh -- the main component for crop production. The current land/person ratio is very unfavourable, and there is little or no scope of expanding the land resource base. In 1997, the per capita land availability was 0.11 hectares, declining from 0.16 hectares in 1981. Agriculture is

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the main user of land resource -- employing directly or indirectly three-fourth of the country's population and contributing about 30 per cent to the GDP (BBS, 1997).

Bangladesh has about 9.56 million hectares of cultivated land, which is about two-thirds of the total area. Of the net area, 17.5 per cent is single crop, 54.7 per cent double crop and 20.4 per cent triple crop, while the remaining 7.4 per cent is cultivable waste and is currently fallow (World Bank, 1998).

The current average cropping intensity is 179 per cent -- an increase from 150 per cent about a decade ago (GOB, 1996).

However, each year the net cropped area continues to shrink due to the loss of cultivable land to alternative uses like urbanisation, housing, industries and other infrastructure development.

The agricultural sector is dominated by rice farming, which covers about 75 per cent of the cropped area. Other grains include wheat (a dry season crop), and maize grown in all seasons. Jute, a natural fibre, is a major cash crop although the share of raw jute and jute goods in the total exports of the country has been declining in recent years. Tea is one of the most dynamic export-oriented cash crops. Other cash crops of significance are tobacco, cotton and sugarcane.

In Bangladesh, the three cropping seasons approximately coincide with the three meteorological seasons. The cropping seasons are Kharif 1 (pre-monsoon), Kharif II (monsoon) and Rabi (dry or winter). Three rice varieties are grown in these different seasons -- Aus, Aman and Boro respectively. Aman is the leading rice crop, accounting for 56 per cent of the cropped area, followed by Boro (27 per cent) and Aus (17 per cent), according to BBS, 1996.

The most significant recent development in agriculture has been the introduction and diffusion of high yielding varieties (HYV) of rice. The first HYV was introduced more than two

decades ago from the International Rice Research Institute (IRRI) in the Philippines. Since the early 1970s, the HYVs released to the farmers are bred at the Bangladesh Rice Research Institute (BRRI) at Gazipur, about 25 kms north of capital Dhaka. At present, HYVs of rice occupy nearly 50 per cent of the rice growing area. HYV Boro is entirely irrigated, while HYV Aus and Aman -- though largely rain-fed -- often require supplementary irrigation.

Poverty with rapid population growth, absence of a proper land use policy, and other driving forces compel people in Bangladesh to over-exploit natural resources like land, which forms a major focus for human economic activities. The functional capabilities of the soil have deteriorated due to unbalanced use of agrochemical, unplanned land use, encroachment on forest areas for agriculture and settlements, ineffective implementation of existing laws and guidelines, and improper disposal of hazardous industrial effluents.

Moreover, urban sprawling and infrastructure development have reduced the availability of land. Natural events such as cyclones and floods cause land loss, and also decrease the functional capabilities of soil. Soil degradation in the coastal area results from unplanned land use, and due to intrusion of saline water. The extent of land degradation varies according to region, season, and year due to the diverse nature of the driving forces and causes.

Degradation of soil quality in the floodplains is mainly attributed to improper use of fertilisers and pesticides to boost agricultural production. Gradual salutation in the floodplains also contributes towards degradation of land. Dispersed industrial growth, and uncontrolled discharge of untreated effluents in the nearby floodplain deteriorate the quality of land and soil.

Land degradation in the coastal areas of Bangladesh is mainly due to cyclones and storm surges inundating the land. Shrimp cultivation occurs round the year in these

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At present, there is meagre HYV rice cultivation in the coastal areas. The environment is also unsuitable for cultivation of any other grain during dry period, except wheat where the temperature permits, and early sowing is possible.

areas, which is ultimately increasing the salinity and degrading soil as well. Intrusion of saline water in the dry season is attributed to the low flow in the river system.

Erosion of topsoil in the hill districts has increased, and 17 per cent of the soil resources have deteriorated between 1964 and 1985. It was found that in the mixed forest-covered land, the topsoil erosion rate is 2.7 to 7.2 tons per hectare per annum. On the other hand, in the deforested hill slopes erosion goes up to 120 tons per hectare per annum. A study in Khagrachhari, Rangamati, and Bandarban areas on topsoil erosion showed that it ranges from 100 to 120 tons per hectare annually.

The concentration of organic materials present indicated the quality of soil and this has deteriorated significantly in the Barind Tract, Madhupur Tract, Himalayan Foothill areas, the floodplains to Tista, Karatoya, and Bangali, and in the hilly Northeast region. Moderate deterioration of organic materials has been observed in the medium highlands of the rivers Tista, the Jamuna, and in the Ganges floodplain.

Bangladesh is experiencing a decline or stagnation in the yield of many crops. At present, there is meagre HYV rice cultivation in the coastal areas. The environment is also unsuitable for cultivation of any other grain during dry period, except wheat where the temperature permits, and early sowing is possible. This is because both dry period Boro and wheat are cultivated in the winter season when salinity also reaches to its maximum, and renders most of the coastal land unsuitable for their production.

Water Ecosystem: Bangladesh is a country richly endowed with water resources. The water ecosystem comprises the tributaries and distributaries of the three major river systems: the Ganges-Padma, the Brahmaputra-Jamuna and the Meghna, and numerous perennial and seasonal wetlands like haors, baors and beels.

All the three major river systems originate outside the country. The combined total catchment area of these major river systems is about 1.74 million sq. kms, of which only seven per cent lies within Bangladesh. Another important feature to be considered for water resource planning is that 57 rivers of varying sizes enter the country from outside the national frontiers. The total length of the river courses is 24,000 kms and covers about seven per cent of the country's territory.

Flooding and river bank erosion -- two very related phenomena -- are common in Bangladesh. Rivers erode parts of their banks during floods and post-flood periods due to current and wave action. Land loss due to river erosion is the highest in the Brahmaputra-Jamuna basin, where the erosion rate is estimated to be between 139 hectares and 358 hectares per year (Elahi and Rogge, 1990).

Recent satellite images of the Ganges-Brahmaputra and the Meghna rivers, studied under the Flood Action Plan [FAP], indicated that 106,300 hectares were lost through erosion, while only 19,3000 hectares were accreted over the period 1982-1992 (World Bank 1998). Riverbank erosion made thousands of families homeless and landless, forcing many of them to move to the urban centres where they live as squatters in the rising number of slums.

A significant trait of Bangladesh's water ecosystem is the seasonality of water availability, i.e., excessive water during the monsoon causing floods, and water shortages in the dry season often causing a drought-like situation. The annual surface water flow whose major source is rainfall -- both inside and outside the country -- is impressively large.

The availability of this water is not uniform throughout the year. For the country as a whole, the dry season flow of water is less than one-fifth of the wet season flow. Owing to the fact that about 93 per cent of the surface water comes from outside the country, there remains an element of uncertainty about the quantum of water that would be available from trans-boundary rivers. The sharing

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of the Ganges water was agreed upon through a treaty with India in 1996, but sharing agreements for all other international rivers are still awaited.

Groundwater is another important component of the water ecosystem. The quaternary alluvium of Bangladesh constitutes a huge aquifer with reasonably good transmission and storage properties. Heavy rainfall and annual inundation help the groundwater to rise almost to the ground level in the wet season.

The first assessment of groundwater was made in 1984, and later on the Master Plan Organisation (MPO) made three estimates in 1991: potential, usable and available recharge. In 1996, the National Minor Irrigation Development Project [NMIDP] -- using a different approach -- projected how much groundwater could be withdrawn, under conditions of receding water, from tube-well extractions.

Despite such varying estimates of groundwater reserves, it is generally agreed that Bangladesh will largely depend on this reserve for expansion of irrigated areas and to meet domestic needs.

Bangladesh is yet to formulate a pragmatic National Water Plan with a conjunctive water use planning (Quamrul, 1998). So far on the supply side, policymakers have over emphasised the use of groundwater more than the surface water. On the demand-side irrigation has received higher priority than the supply of safe drinking water. The fallout is mass scale arsenic contamination.

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A scenario of water availability can be obtained only through an understanding of conjunctive water use planning. The National Water Plan [NWP-II] in 1991 had projected a water demand in the critical dry month of March, by the year 2018, of about 24,370 million cubic metres, while the supply from both

surface and groundwater sources will be about 23,490 million cubic metres -- showing a shortfall of 880 million cubic metres.

This shortfall will be caused by increased irrigation. The NWP estimated that by the year 2020, 6.90 million hectares of land would be brought under irrigation out of a total 7.56 million hectares of irrigable land (World Bank, 1998).

The environment, economic growth and development of Bangladesh are all highly influenced by water - its regional and seasonal availability, and the quality of surface and groundwater. Spatial and seasonal availability of surface and groundwater is highly responsive to the monsoon climate and physiography of the country.

Availability also depends on upstream withdrawal for consumptive and non-consumptive uses. In terms of quality, the surface water of the country is unprotected from untreated industrial effluents and municipal wastewater, runoff pollution from chemical fertilisers and pesticides and oil, and lube spillage in the coastal area from the operation of sea and river ports and ship breakage.

Water quality also depends on effluent types and discharge quantity from different type of industries, the type of agrochemicals used in agriculture and seasonal water flow, and dilution by the river system.

The arsenic concentration in the groundwater is a major problem in Bangladesh now. High levels of arsenic cause serious human health problems if imbibed for a long time (from 5 to 15 years); including skin ailments, damage to internal organs, skin and lung cancers, and eventual death.

The recent major studies carried out on arsenic reveal that among 30,000 tubewells studied, 2,000 of them exceeded the national standard of 0.05 mg/1 for drinking purposes (the WHO guideline is 0.01 mg/1). The problem is acute in tubewells abstracting groundwater from 10 ma to 100 depths

These are regarding proper implementation of national policies, due to the lack of institutional capability and awareness to properly address the policy objectives and goals. The emerging issue of climate change and its adverse impacts on water resources needs proper consideration for planning.

in the Southeast, South Central (the northern part only), and Southwest regions, and occurs to a lesser extent in the eastern part of the Northeast region, and the very southern fringe of the North Central and Northwest (along the river Ganges).

The most seriously affected districts are in and around Chandpur. It has been estimated that more than 20 million people drink water exceeding the national standard for arsenic levels.

Notwithstanding the large number of rules and regulations to protect water from industrial effluents and other pollution, and the policies for enabling the environment through dry season augmentation of water concerns for the future still prevail.

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Earlier analysis of climate change scenarios showed that water scarcity in the dry season would be aggravated and low water flow in the river system would allow saline water intrusion to

In recent years, as a direct consequence of population increase and agricultural expansion causing water regime modification, many wetlands have shrunk or disappeared. Such degradation has brought about a biodiversity loss, reduction in fish habitat, and an increase in the flood-proneness of certain floodplains (Quamrul, 1997).

progress further inland. Climate change induced adverse impacts on agriculture will put further stress on the country in attaining food sufficiency in the future.

Wetlands: The wetlands of Bangladesh (haors, baors and beels as well parts of the floodplains that remain inundated for parts of the year) cover about 16,000 sq. kms or 11 per cent of the country's area. However, the wetland area has often been estimated to account for nearly 50 per cent of the territorial land including estuaries and mangrove swamps along the coastal belt.

Wetlands in Bangladesh have great ecological and economic significance. They are a hotbed of biodiversity and contain flora and fauna of local, national

and regional significance. Besides being a habitat of aquatic plants and animals, the wetlands help in the storage of floodwater, provide a rich source of inland fisheries, and facilitate water transport.

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Fisheries: The loss of fish habitat is a matter of serious concern because fish is one of the prime dividends of the water ecosystem. More than 70 per cent of animal protein in an average Bangladeshi's diet is obtained from fish, and this sector provides income for about 12 to 13 million people (GOB, 1998).

Indeed, Bangladesh is the world leader in open-water fish production per unit area. Open-water capture fishery sustains itself on the extensive network of inter-linked aquatic habitats, which provide the areas for fish spawning and migration. Closed-water culture fishery includes harvest from ponds, baors (ox-bow lakes) and coastal shrimp farms.

Shrimp farming is becoming the principal activity in coastal brackish aquaculture. It is currently practised in temporal conjunction with a rice crop or salt production or as a mono-cultural activity. Marine fishery accounts for about 27 per cent of the total fish harvest of the country.

Bangladesh possesses good terrestrial and aquatic environment that provide habitat for a large number of plants and animals. The delta is rich in fish and aquatic resources and other biodiversity. Rivers and other inland water bodies provide habitats for 266 indigenous fish

The marine water bodies are also remarkable in biodiversity, harbouring 442 species of fish and at least 36 species of marine shrimps. About 336 species of molluscs, representing 151 genera have been identified from the Bay of Bengal. In addition, several species of crabs and 31 species of turtles and tortoises, of which 24 live in freshwater are found in Bangladesh.

species (belonging to 55 families) and 150 species of birds. The inland water bodies are also the habitat of 56 species of prawns. More than 20 species of freshwater molluscs have been identified.

The marine water bodies are also remarkable in biodiversity, harbouring 442 species of fish and at least 36 species of marine shrimps. About 336 species of molluscs, representing 151 genera have been identified from the Bay of Bengal. In addition, several species of crabs and 31 species of turtles and tortoises, of which 24 live in freshwater are found in Bangladesh.

However, shrimp cultivation has become a major concern from the past decade. It has caused serious environmental damage that has harmed fish and other aquatic biodiversity significantly. The physical loss and modification of aquatic habitats for fish, prawn, turtle and other aquatic organisms are said to be the major factors involved in overall fish varieties depletion.

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Such shrinkage has been the result of thousands of physical structures and drainage systems that have been constructed in Bangladesh in an effort to control floods, cyclones and other natural calamities. These structures have disrupted the natural flow of waters in closed rivers, diverted rivers and have dried up water bodies.

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Coastal ecosystem: A vast network of rivers, an enormous discharge of river-borne sediments, a large number of estuarine islands, strong tidal actions and vulnerability to tropical cyclones characterise the coastal environment of Bangladesh. The coast is about 710 kms long, measured along the shores of the Bay of Bengal between India (on the west) and Myanmar (on the southeastern tip). The coastal districts cover some 23 per cent of the country's territory and account for 27 per cent of the total population.

The coastline of Bangladesh can be divided into three main zones -- the western, central and eastern (Quamrul, 1997). Each zone contains distinct coastal landforms, and geomorphic and biological characteristics. The western zone extends from the international border with India to Tetulia river (east of Barisal) and the central zone extends from the Tetulia river point to the Feni river estuary (including the Meghna estuary). The eastern zone starts from the Feni river and continues up to the southern tip of the mainland beyond Cox's Bazar -- extending up to the Naaf estuary.

The western and central zones are part of the Ganges-Brahmaputra-Meghna delta system, whereas the eastern zone is non-deltaic. In the west, mangrove forests, i.e. the Sundarbans, dominate the coastal fringe. The central zone witnesses sediment-rich freshwater flows and their interaction with tides. In the eastern zone, wave action dominates the open-ocean front, though mangroves exist within sheltered estuaries.

The natural shape of the coastlines of Bangladesh is controlled by the forces of erosion and deposition, involving rivers, tides and waves. Straight coastlines of beaches and dunes are formed in the southeast where waves are strong. In zones where tidal action predominates, as in the western zone, tidal creeks of complex patterns are common, while the deposition of riverine sediments produce islands and estuaries in the central zone.

Population density in the coastal districts is slightly higher than the national average, and the rate of increase is also similar to the national trend. In addition to the permanent coastal population, there is a significant number of new and seasonal migrants to the coastal areas, especially to the newly emerging chars (shoals).

Seasonal migrants also include migrant fishermen who fish in the Bay. The two seaports of Bangladesh along this coast are Mongla (near Khulna) in the southwest and Chittagong - which

Shrimp farming has inevitably created a conflict in land use with rice farming in the coastal zone. Since it is an export commodity and brings substantial foreign exchange, poor farmers in shrimp growing areas are losing the battle and are increasingly being forced to move and become landless.

handles the bulk of import and export commodities -- in the southeast. These two port cities are the major urban centres in the coastal region.

Fisheries in the coastal zone range from fully inland fresh water fisheries, through shrimp and other mixed freshwater and saltwater fisheries to fully marine fisheries in the Bay of Bengal. Brackish water fisheries on the coast (where saltwater and freshwater mix) have increased in recent years with the intensification of shrimp farming -- one of the fastest growing export industries in Bangladesh.

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Mangrove forests in the coastal area are an important natural resource. The largest of these forests is the Sundarbans. The Chakaria Sundarbans, along the southeastern Chittagong coast, are shrinking due to encroachment by shrimp farms. The Department of Forest has a scheme of planting mangrove trees along the shores for cyclone and embankment protection, and on newly accreted land for their stabilisation. The mangrove forests supply fuel wood for domestic and industrial use, timber for industry, and a range of other non-wood products.

There is a seasonally moveable salinity interface in the coastal area and estuaries, with the threshold limit for agriculture (2dS/m) moving inland in May in the southern part of Bhola and other southern islands. There are also salinity issues in the Southwest region, attributed to reduced dry season flows into the area from the Ganges system.

During the 1990s dry season, salinity levels in the Khulna area rose, for which one of the likely causes was also postulated to be the decrease in dry season surface flow from the Ganges. Surface water scarcity is observed in the Sundarbans, Chittagong, Noakhali, and Dhaka regions, where the ecological and environmental demands for surface water are higher than the supply.

Natural resources: The primary non-renewable resources in Bangladesh belong to the energy sector, and the country is generally poor in non-fuel minerals. Bangladesh heavily depends on traditional energy sources like bio-mass, especially in rural areas. National endowments of commercial energy, too, are modest.

Non-renewable commercial energy resources include coal, oil and gas. Good quality bituminous coal -- discovered about 40 years ago -- is deposited at a depth of over 1000 meters at Jamalganj in western Bogra district. The reserve is estimated to be more than 1000 million tons. Geological exploration in northwestern Bangladesh also indicated probability of discovering coal reserves in that area.

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Bangladesh has no significant oil deposit. But the country is endowed with an untold reserve of natural gas, which is currently its only non-renewable energy resource. It is the main source of commercial energy, accounting for 70 per cent of the country's commercial energy supply.

About 90 per cent of the country's power generation is based on natural gas and the entire urea fertiliser requirement of the agriculture sector is met by using gas as raw material. The proven gas reserve is estimated at about 23.21 trillion cubic feet [TCF], of which 13.73 TCF is considered to be recoverable.

Hydrocarbon exploration in Bangladesh started as early as 1910. The first gas field was discovered in Sylhet in 1955, and so far 20 gas fields have been discovered in the eastern and southeastern parts of the country, including the offshore field at Sangu, off the coast of Chittagong.

The government has recently opened up the oil and gas sector to private investment, inviting international oil companies for exploration and development activities under production sharing contracts.

The Sundarbans support a very rich and diverse fish fauna of 400 species, over 270 species of birds and over 300 species of plants. It is an important staging and wintering area for migratory shore birds, gulls and terns. The Sundarbans comprise the largest remaining tract of habitat for the rare Royal Bengal Tiger (*Panthera tigris*).

The country has been divided into 23 hydrocarbon blocks, of which eight have already been awarded to foreign companies for exploration of oil and gas. The remaining blocks are now in the process of being offered to the foreign oil companies under the second round bidding.

Biodiversity: Biological resources and diversity form the basis of both the ecology and economy of Bangladesh. The country's agriculture, fisheries and livestock, along with a number of other sectors are heavily dependent, directly or indirectly on biological resources.

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There is a great potential in Bangladesh for biodiversity based sustainable development. In spite of the threatened wild fauna and flora, there are nearly 10,000 species of plants, animals and microbial organisms - a good percentage of which are found in superabundance. A wise and sustainable yield and harvest methodology and management plan need to be formulated and applied at the field level. So that these biological resources are not over-exploited, and the economy of the country prospers.

Renewable resources: Forestry is one of the major sectors of renewable resources in Bangladesh, which contributes to the economic and ecological stability. Yet this is also a major vulnerable sector, facing continual depletion. Actual forest cover is approximately one million hectares, or only about six per cent of the total land area. Under the management of the Department of Forest, there are three main types of forests in three separate zones.

These are (a) tropical evergreen or semi-evergreen hill forests in

southeastern Chittagong, Chittagong Hill Tracts and north-eastern Sylhet district, (b) deciduous forests in central Bangladesh, and (c) tidal mangrove forests in south-western Khulna district and the southern coastal belt. The hill forests account for 47 per cent of the forest area and supply around 40 per cent of the commercial timber production. The important timber species of these forests are garjan, jarul, gamari, koroï and shegun (teak). Parts of the forests have also been converted into rubber plantations.

The deciduous forest of central Bangladesh had originally extended beyond the Madhupur Tract into the northern districts. Sal is the predominant species here. This forest area has suffered massive degradation in the past three decades through illegal cutting and human encroachment. Unscrupulous timber merchants and poachers have not only cut down the mature trees, but have also dug out the stumps -- leaving the area barren without any regeneration potential.

The mangrove forest of the Sundarbans, in the greater Khulna district, is the world's largest single tract of mangrove - parts of which spill over across the border into the Indian state of West Bengal. The total area of the Sundarbans is about 555,000 hectares, including waterways. Classified as a "reserved" forest, it provides timber, pulpwood and fuel wood. The main tree species of the Sundarbans are sundari, gewa, goran and keora. The most commercially important species, the sundari, has been adversely affected by increasing salinity levels.

The mangrove forest of the Sundarbans, in the greater Khulna district, is the world's largest single tract of mangrove -- parts of which spill over across the border into the Indian state of West Bengal. The total area of the Sundarbans is about 555,000 hectares, including waterways.

The Sundarbans forest supports numerous and diverse animals, including the famous Royal Bengal tigers, birds, amphibians and reptiles of commercial and conservation importance. The fauna includes 120 commercially important fish species, 270 species of birds (including 95 types of water fowl), 50 species of reptiles, and 42 species of mammals like tigers, rhesus monkeys, spotted deer and wild boars. But unfortunately, the Sundarbans are in a state of decline due to a combination of causes, some

of which are man-made including, unsustainable forestry management.

In addition to the above-mentioned forest areas under government control, there are private forests in villages around homesteads -- all over the country. Although these homestead forests comprise only 11 per cent of the total forest area of the country, they are characterised by high productivity and efficient management.

The government in 1993 prepared a Forestry Master Plan followed by the formulation of a new forestry policy in 1994. The Plan aspires to attain tree cover of 20 per cent of the total land area, and undertake reforestation of all degraded and denuded forest areas over a period of 20 years. In the reforestation programme, the private sector is being encouraged to participate in planting, nurturing and harvesting tasks through the social forestry model.

Poverty and population boom: The rising number of the poor and the population boom have been the two major challenges facing Bangladesh. Poverty does not just mean a lack of income. It also means a permanent state of vulnerability and lack of access to resources. The poor in both rural and urban areas see sustainable livelihoods as depending upon secure employment and access to productive resources.

Bangladesh is often cited as a country with one the highest population densities in terms of numbers, disregarding the productive capacity of its human resources. People can resolve the resource constraints if their local wisdom and knowledge is supported to enhance production and quality of life.

In general, they are more concerned with the exploitation of the environment in order to meet basic needs than with its protection and regeneration. Poverty and environment in Bangladesh are thus, caught in a vicious cycle - the growing number of the poor are forced by the few powerful rich to over utilise the environmental resources and put strain on their carrying capacity, while the environmental degradation (from overuse) further limits access to resources for the poor. The few rich are getting richer. The income inequality is also widening (Quamrul, 1998).

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with one the highest population densities in terms of numbers, disregarding the productive capacity of its human resources. People can resolve the resource constraints if their local wisdom and knowledge is supported to enhance production and quality of life.

Unfortunately, due to the use of unsustainable technologies in agriculture, the country's natural resources (land and water) are already under intense pressure. The narrow biological and genetic base of agriculture has become a threat for the agrarian systems. Bangladesh has demonstrated that increase in agricultural productivity is possible without exacerbation problems of soil fertility, water quality and ecological cost.

In the final analysis, poverty, population growth and environment have strong linkages in Bangladesh. The continued stress on natural resource potentials caused by increasing population will retard the poverty alleviation efforts.

In this context, so far as Bangladesh is concerned perhaps on other areas deserve as much attention as the issue of sustainable agricultural and rural development strategies as enshrined in Chapter 14 of Agenda 21.

Poverty still remains a major environmental concern for Bangladesh. The links between poverty and environment demand formulation and implementation of alternative and innovative anti-poverty safety net programmes and, at the same time, promote sustainable development through increasing the productivity of natural resources involving the people in planning, decision-making and management (Quamrul, 1996).

But a major constraint in anti-poverty drive in Bangladesh is the high rate of population growth. Population pressures have added to the stresses on natural resources and contributed to their over-exploitation. Some impressive achievements have been made during the past 20 years in reducing fertility.

Bangladesh has made commendable progress in the area of health & family planning. Effective family planning policies have helped in bringing down the population growth rate from 2.6% in the 1960s to 2.1% in the 1990s. Immunisation coverage in Bangladesh is the highest in South Asia.

It has been treated as a model country with respect to disaster

management experience. Communities living in the vulnerable zones of Bangladesh have enormous coping capacities. Community resilience through indigenous coping capacities and improved warning systems are appreciated. Efforts must be made to expand activities that require full community participation for enhanced disaster prevention and mitigation.

In Bangladesh, concentration of poverty incidence is more prominent along the riverbank and vulnerable coastal zone. People living in the flood prone areas are susceptible to widespread starvation during the severe flood years.

However, Bangladesh offers a marvellous example to the world for the dynamism of its civil society organisations and development NGOs. Yet while civil society organisations have become worthy interlocutors for the poor and the disenfranchised, it is also apparent that the long term sustainability of poverty reduction depends, to an important degree, on real local self-articulation.

And this is where Bangladesh is redefining the agenda for development policy. Currently 10.2 million people in Bangladesh have access to microfinance services under government supported programmes, including the Grameen Bank, and more than 500 NGOs. Efforts to commercialise micro-credit system, however, are likely to push the NGOs further away from comprehensive social development programmes, which will have adverse impact on the poor.

Bangladesh has unique characteristics in the sense that the rural livelihood is based on biodiversity-based production systems where the majority can survive if the existing life support systems are maintained and enhanced.

In achieving sustainable development maintenance and regeneration of common property resources (CPRs) are important, as is the issue of increasing access of the poor to CPRs.

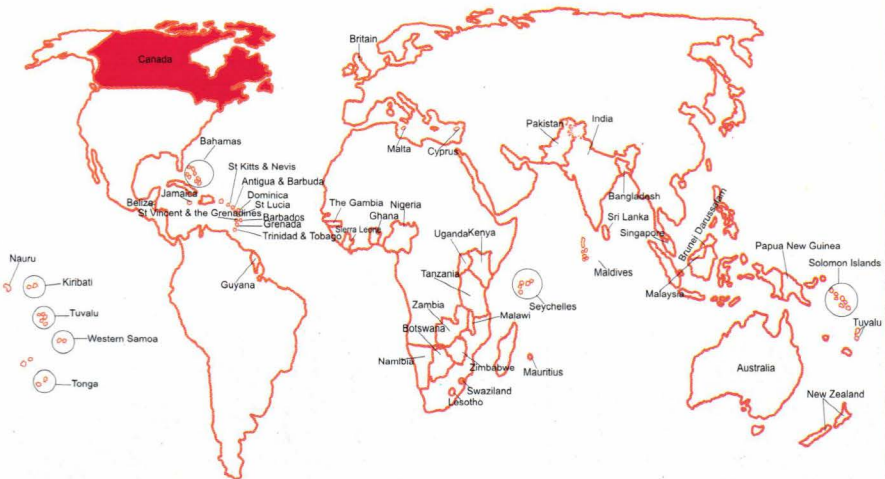
In the final analysis, poverty, population growth and environment have strong linkages in Bangladesh. The continued stress on natural resource potentials caused by increasing population will retard the poverty alleviation efforts. Thus, it is critical to get a further and more rapid reduction in population growth to achieve sustainable development.

Bangladesh steps into the third millennium with a vision for sustainable human development based upon a coalition of people across and within nations to achieve a just society in an atmosphere of peace, security, and harmony. This requires equity (within and between nations), prosperity (which must be inclusive of all strata in society sharing the fruits), and efficient and equitable management of the natural and biological resource base and the life-support systems globally, regionally, nationally and locally.



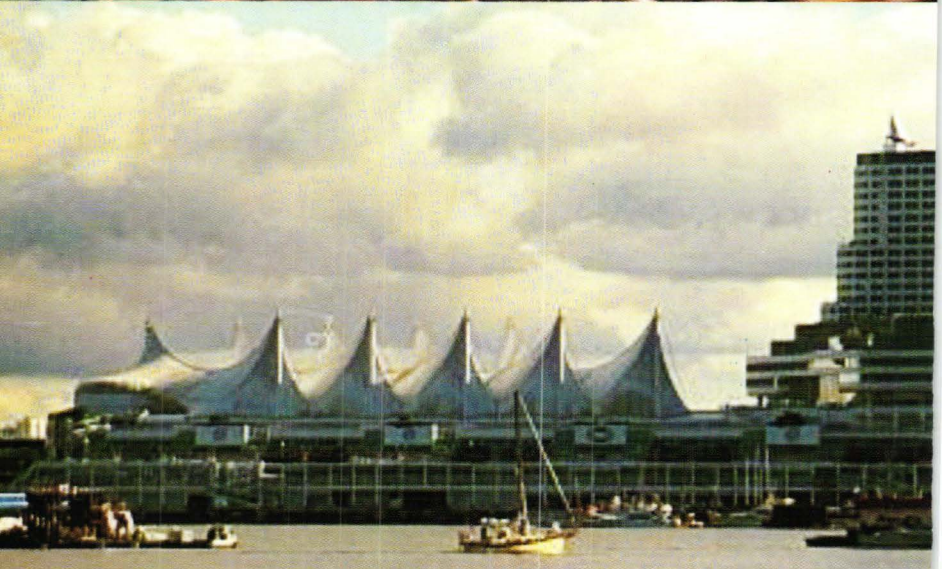
CANADA

Environmentally alert Canada



State of Commonwealth Environment





Environmentally alert Canada

Situated north of the USA, between the Atlantic and Pacific Oceans, Canada is the world's second largest country. It extends some 7700km (4775mi) east to west and 4600km (2850mi) north to south. Nearly 90 percent of Canadians huddle along the 6379km (3955mi) southern border with the USA. Though much of the land is lake and river-filled forest, there are mountains, plains and even a small desert.

The Great Plains, or prairies, cover Manitoba, Saskatchewan and parts of Alberta. These former grasslands are now responsible for Canada's abundant wheat crop. Western Canada is known for its Rocky Mountains, while the east has the country's major cities and also its most visited geographic feature, Niagara Falls. The Canadian Shield, an ancient, rocky and glacial region, formed more than 2.5 billion years ago, covers most of the north of the country. The Arctic region, in the far north, is where you'll find frozen tundra merging into islands that are ice-bound for most of the year.

Canada has an incredible mix of native flora and fauna. It comprises eight vegetation zones, most of which are dominated by forest. Some of the common tree species include white and black spruce, balsam and Douglas fir, western red cedar, white pine and the sugar maple, one of Canada's best-known symbols - the maple leaf appears on the country's flag. Endemic animals include the grizzly, black, brown and polar bears, beaver, buffalo, wolf, coyote,

The Government of Canada is taking action on clean air that will bring benefits in the short-term, and setting a long-term agenda that will mean clean air for generations to come. Clean air is being addressed by actions on transportation emissions, transboundary pollution, industrial emissions and science, along with encouragement for the many different things that can be done at the corporate level and by individuals.

Environment Canada and others have observed contamination of the ground waters of the Abbotsford Aquifer by nitrates since the early 1950s (Liebscher et al., 1992). A monitoring program for the area of the Aquifer south of Abbotsford, B.C., was developed by Environment Canada in the early 1970s and a number of sites in this study area have been sampled regularly. Since 1992, the average concentrations of nitrate (expressed as nitrogen or nitrate-N in this indicator) observed that these sites have frequently exceeded the 10-mg/L guideline for Canadian Drinking Water Quality.

lynx, cougar, deer, caribou, elk and moose. There are also 500 species of birds, such as the great blue heron, Canada geese and many varieties of duck.

Moves are afoot to ensure protection for endangered species like the beluga whale, burrowing owl, whooping crane and eastern wolf. Canada has 39 national parks, 145 parks-administered national historic sites and 13 areas of such natural significance that they are on the UN World Heritage list

Clean Air

The Government of Canada is taking action on clean air that will bring benefits in the short-term, and setting a long-term agenda that will mean clean air for generations to come. Clean air is being addressed by actions on transportation emissions, transboundary pollution, industrial emissions and science, along with encouragement for the many different things that can be done at the corporate level and by individuals.

Canada is developing an integrated strategy on clean air for vehicles and the fuels that power them, for industrial emissions, for transboundary air pollution with the United States and other countries, and for engaging Canadians in developing solutions to clean air issues.

Smog

Smog, the term given to a haze in the air, is a potential risk to health. The key smog pollutants are ground-level ozone (O₃) and fine airborne particulate matter (PM). A major source of these two smog pollutants is the burning of fossil fuels in vehicles, factories, thermal power plants, and home furnaces. Soil, road dust, fires and industrial and agricultural activity also

contribute to the fine particle mass. Both these smog pollutants are monitored in the valley by the Lower Fraser Valley Air Quality Monitoring Network, operated by the Greater Vancouver (GVRD) and Fraser Valley Regional Districts (FVRD). For this Smog Indicator, three Fraser Valley monitoring sites, which have data records for both ozone and particulate, are used.

Unlike the stratospheric ozone high above the earth's surface that filters out harmful ultraviolet rays from the sun, ground-level ozone can be harmful to human health. Although ground-level ozone occurs naturally, excessive levels are the result of human activity. This happens when nitrogen oxides (NOx) from the combustion of fossil fuels and volatile organic compounds (VOCs) found in solvents, oil-based paints and gasoline, react in the presence of warm temperatures and sunlight.

Airborne particulate are minute particles small enough to remain suspended in the air and together with other air pollutants give smog its colour. Common terminology uses PM10 to refer to all particles less than 10 microns in diameter, and PM2.5 to refer to particles less than 2.5 microns in diameter. For comparison, a human hair is approximately 70 microns wide.

Regional air quality is most often assessed by comparing monitoring data to national and provincial guidelines or objectives. On the basis of this type of comparison, air quality is characterised as good, fair or poor. On days when smog levels are expected to produce poor air quality, public advisories are issued. The levels at which such advisories are issued are 82 ppb over a one-hour period for ozone and 50 µg/m³ over a 24 hour average for particulate matter. However, recent research indicates that there is no 'safe' or threshold level of human exposure to either ground-level ozone or particulate matter below which health effects do not occur (National Ambient Air Quality

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Objectives For Ground-Level Ozone and For Particulate Matter, Science Assessment Documents, 1999). Reductions in ambient levels of these smog pollutants are expected to have public health benefits.

Reference Levels are defined as the lowest ambient ozone and particulate matter concentrations at which statistically significant increases in human health effects have been detected. The Federal-Provincial Working Group on Air Quality Objectives and Guidelines (1999) established Reference Levels for PM₁₀, PM_{2.5} and ozone. These Reference Levels are 20 ppb 1-hour daily maximum for ozone and 25 µg/m³(PM₁₀) and 15 µg/m³ (PM_{2.5}) averaged over a 24 hour period for particulate (National Ambient Air Quality Objectives for Ground-Level Ozone, July 1999 and National Ambient Air Quality Objectives for Particulate Matter, 1999). Comparison of air quality data in relation to these Reference Levels therefore provides a measure of potential health risk.

The percent of time each year that ground-level ozone and particulate matter data exceed Reference Levels is being tracked as an indicator of potential health risk. The analysis of the data in this manner is intended to provide the Fraser Valley residents with an informative and relevant indicator of the status and trends in their air quality.

Water

Environment Canada and others have observed contamination of the ground waters of the Abbotsford Aquifer by nitrates since the early 1950s (Liebscher et al., 1992). A monitoring program for the area of the Aquifer south of Abbotsford, B.C., was developed by Environment Canada in the early 1970s and a number of sites in this study area have been sampled regularly. Since 1992, the average concentrations of nitrate (expressed as nitrogen or nitrate-N in this indicator) observed that these sites have frequently exceeded the 10-mg/L guideline for Canadian Drinking Water Quality. Of 1,933 ground water samples collected from monitoring wells called piezometers, 71 percent of these study area samples have exceeded the 10 mg/L nitrate as nitrogen guideline with individual values ranging from a low of 0.025 mg/L to a high of 91.9 mg/L.

The large range in maximum and minimum nitrate

concentrations reflects the different conditions observed at different piezometers. Nitrate concentrations in some piezometers fluctuated above and below the nitrate Guideline, while in others they were consistently below or above the Guideline. The maximum nitrate concentrations measured in 1996, 1997 and 1998 were from samples taken from one piezometer. Nitrate concentrations can be very site specific and dependent on the local soil characteristics, topography and the land use activities near and up-gradient from the sampling site. Precipitation recharges or adds water to the aquifer, and the leaching of nitrogen compounds from the soil to the ground water as water percolates downward has an effect on nitrate values.

The study area includes the central, more agriculturally developed part of the aquifer and many of the sampling sites tend to be located near the international border. Consequently, some researchers do not consider these study area nitrate concentration data as being representative of the entire aquifer. A recent federal/provincial report on trends in water quality in British Columbia (BC) reports that of nineteen monitoring wells sampled in the Abbotsford Aquifer, seven exceeded the nitrate drinking water guideline (Trends in Water Quality in British Columbia, report in prep., May 1999). Other studies by Liebscher et al., 1992; Carmichael et al., 1995; Wassenaar, 1995; Zearth et al., 1998 and Hii et al., 1999 have all shown elevated nitrate concentrations over a wide portion of the aquifer.

Stratospheric ozone thickness

Environment Canada monitors stratospheric ozone at 12 locations across Canada. In British Columbia it has been measured since 1993 on Saturna Island in the Strait of Georgia. The ozone thickness is measured from the ground using a Brewer ozone spectrophotometer and represents the column of ozone above the instrument. The ozone thickness varies seasonally. In

In spite of the natural climate variations, analysis of temperature data from thirteen climate stations across the region shows a general warming trend has been occurring throughout BC and Yukon. Much of this warming has been measured in the daily minimum temperatures rather than in the warmest part of the day. In other words, temperatures at night have been getting less cold.

the winter, the ozone thickness is usually high, but there are large deviations from the pre-1980 baseline. In the summer, the ozone thickness is usually low, with smaller deviations. The pre-1980 stratospheric ozone measurements are considered to be representative of normal levels prior to the beginning of the depletion of ozone, since ozone depletion had not been observed prior to 1980.

In 1999, average ozone thickness over Saturna Island was near the pre-1980 baseline, although it was slightly below normal in the early half of the year. Ozone concentrations are naturally variable, and the current pattern of near normal values should not be interpreted as a complete recovery of the ozone layer. Environment Canada scientists continue to predict a thinning of the ozone layer over the next ten or twenty years, and forecast that a full recovery is not likely for at least 50 years.

By 1995, the ozone layer over southern Canada was an average of about 6 percent thinner than it was in the late 1970's. The largest depletions over southern Canada occurred during the spring months, where ozone thinning was about 8 percent to 10 percent, and sometimes reached 20 percent for short periods. Ozone depletion was most severe in the high Arctic during the early spring, where reductions of up to 45 percent have been recorded in recent years. Since 1996 there has been a temporary recovery over southern Canada, where ozone thickness now averages only about 3 percent below the pre-1980 values, again probably caused by a natural climate variation. However, scientists predict that the ozone layer will begin thinning again once the climate shifts back to a more normal mode. It is expected that the Canadian ozone layer will not really begin to recover for another ten to twenty years.

Climate change

The world's climate has not been constant. We know it has gone through dramatic past changes, but there is increasing evidence that human activities are altering our climate at an unprecedented rate.

When assessing climate change, natural variability must also be considered. Conditions can vary from one year to the next, and cyclic phenomena like El Nino and the Pacific Decadal Oscillation exert important influences over the climate in the region.

In spite of the natural climate variations, analysis of temperature data from thirteen climate stations across the region shows a general warming trend has been occurring throughout BC and Yukon. Much of this warming has been measured in the daily minimum temperatures rather than in the warmest part of the day. In other words, temperatures at night have been getting less cold. As can be seen from the map, maximum and minimum temperatures in the region are showing an increasing trend at the thirteen climate stations shown. For minimum temperatures this increasing trend is statistically significant at all stations except Fort Nelson. For maximum temperatures this increasing trend is only significant in the Yukon and in southeast BC (Kamloops, Summerland and Cranbrook).

In addition to the natural global factors noted above, there are also changes within the climate system itself, such as El Nino that can cause large regional changes in climate. But these changes alone seem insufficient to explain the steadily accelerated warming occurring across British Columbia and Yukon since the mid 1970's. In fact, throughout North America and the globe, mean surface temperatures have generally been rising for the last 100 years. The global average surface temperature has increased over the 20th century by about 0.6oC. Average global temperatures continue to set records. Nine of the 10 warmest years globally have occurred since 1990 and 1998 was the warmest since 1861 both globally and in much of Canada. Since modern record keeping began, 2001 ranks as the second warmest year globally.

Although we recognise the need to take action within our region and throughout the country, climate change is a global problem that needs a global solution. At the third conference of the Parties

Environment Canada plays a key role in improving global awareness of climate change and its impacts. It is a major participant in the United Nations Framework Convention for Climate Change, the Intergovernmental Panel on Climate Change and the World Climate Change Research Program. At the Canadian Centre for Climate Modelling and Analysis in Victoria, BC, Canadian scientists are studying the mechanisms of climate variability with the aid of computerised global climate models.

(CoP3) of the U.N. Framework Convention for Climate Change held in Kyoto, Japan in 1997, Canada agreed to reduce its greenhouse gas emissions by six per cent from 1990 levels by 2008-2012. Although a total of 38 industrial countries made commitments to cut greenhouse gases under the first phase of the Kyoto plan, the treaty has not been ratified. The U.S., which alone accounts for 25 percent of global emissions, has not been prepared to ratify the Kyoto commitments. Canada has remained committed to the Kyoto Protocol and continues to work to build a strong multi lateral consensus. At CoP6 in Bonn, more than 180 nations agreed to advance the Kyoto Protocol and the legal text was agreed upon at the November 2001 CoP7 in Morocco. Although the United States has not signed on, committed countries hope to ratify the protocol. The Intergovernmental Panel on Climate Change (IPCC) maintains that the ratification of the 1997 Kyoto Protocol still represents an essential first step to halt the build-up of greenhouse gases.

One greenhouse gas management option, emission trading, is being explored through the Greenhouse Gas Emission Trading Pilot Project (GERT). Emission trading is a system where companies that exceed their emission quotas can either purchase the unused emission quotas from other companies, or invest in projects to reduce emissions in other locations. GERT, launched in 1998 and scheduled to continue until 2002, is a voluntary partnership between governments, industry and environmental organisations aimed at providing practical experience with this market based approach. The experience gained from GERT will be important in designing and administering a national emissions trading program, which is one of the management options being considered for meeting Canada's Kyoto commitment.

Environment Canada plays a key role in improving global awareness of climate change and its impacts. It is a major participant in the United Nations Framework Convention for Climate Change, the Intergovernmental Panel on Climate Change and the World Climate Change Research Program. At the Canadian Centre for Climate Modelling and Analysis in Victoria, BC, Canadian scientists are studying the mechanisms of climate variability with the aid of computerised global climate models. Glaciologists from the Geological Survey of Canada and scientists at Environment Canada's National Water

Research Institute (NWRRI) have joined together in a National Glaciology Program to study the impact of climate change on glacier reserves. The glaciers that feed BC's Columbia River system are a major component of that work since changes in the hydrology would lead to reductions in the system's ability to achieve the goals of reliable power production, flood control and sustainable fisheries. Many other climate related research activities are also in progress across Canada.

In 2000, Canada's Action Plan on Climate Change was unveiled. This \$500 million Plan focuses on key sectors and includes initiatives in transportation, energy, industry, buildings, forestry and agriculture, international projects and science and technology. In its February 2000 budget, the government committed \$100 million for climate change initiatives in developing countries and \$15 million to join the World Bank's prototype carbon fund. The 2000 budget provided funds for a variety of activities related to climate change: \$60 million to extend a number of energy efficiency and renewable energy programs; \$100 million to establish the Sustainable Development Technology Fund; \$125 million to establish the Green Municipal Enabling Fund and the Green Municipal Investment Fund; \$15 million to expand the government's purchase of green power; and \$60 million to enhance Canada's capability in climate science. \$1.3 million was specified for BC Climate Change projects.

The Climate Change Action Fund was established by the Government of Canada in 1998 and is co-managed by Environment Canada and Natural Resources Canada. The original three-year, \$150 million fund, was renewed for another three years in Budget 2000 and given an additional \$150 million to build public understanding of climate change impacts and promote reductions in greenhouse gas emissions. Funding from Budget 2000 brings the federal investment in climate change to more than \$1.1 billion.

In June 2001, the federal government

In June 2001, the federal government announced a 5 year \$23 million Fuel Cell Alliance program to help reduce vehicle emissions that contribute to global warming. To help the transition to clean-burning fuel cells, hydrogen-refuelling stations will be provided in several provinces including British Columbia.

announced a 5 year \$23 million Fuel Cell Alliance program to help reduce vehicle emissions that contribute to global warming. To help the transition to clean-burning fuel cells, hydrogen-refuelling stations will be provided in several provinces including British Columbia. Other initiatives include a \$16 million program to negotiate voluntary improvements in vehicle efficiency; a \$40 million program to help municipalities showcase innovative public transit ideas; and a \$30 million program to encourage new projects to make transportation more efficient.

Atlantic Coastal Action Program (ACAP)

The Atlantic Coastal Action Program (ACAP) is a network of 13 community-driven, watershed-based ecosystem initiatives located across the four Atlantic Provinces. Since 1991, citizens, community organisations, private sector organisations, municipalities, universities, First Nation representatives, and a number of federal and provincial government departments have been collaborating to develop broadly supported strategies for the restoration and sustainable use of their watersheds. This is a shared responsibility, and everyone contributes, learns, and benefits.

To date, over 400 projects have been undertaken involving hundreds of organisations and thousands of volunteers. Science and monitoring projects have supported informed decision making, linking scientists with communities and science with other forms of information. Results have included pollution prevention, restored habitats, reduced waste, upgraded sewage treatment facilities, improved energy efficiency, the establishment of new parks, the creation of artificial wetlands, reduced risks to human health, and increased employment.

Phase II of ACAP is focusing on implementing individual site strategies, expanding the ACAP network, and collaborating with others to better understand the science and achieve measurable ecosystem goals.

The Canadian bio-diversity strategy

Ten years after the Rio Earth Summit, Canadians can be proud of the significant progress that all Canadian jurisdictions have made in implementing the Convention on Biological Diversity, ratified by Canada in 1992.

The Canadian Bio-diversity Strategy was endorsed by all jurisdictions 1996 as Canada's formal response to the Bio-diversity Convention. Since then, each jurisdiction and each sector has been implementing the Strategy according to its own priorities and circumstances. There are issues of national importance, however, that require collaborative action.

In 2001, the Forests, Wildlife, and Fisheries and Aqua-culture Ministers' Councils met jointly and agreed to collaborate on four priority bio-diversity issues of Canada-wide concern. At their 2002 joint meeting, Ministers noted progress in all four areas:

Stewardship

Stewardship is a key conservation tool for involving individuals, organisations and their communities in both preventing loss, and recovering species and habitat. Ministers have approved Canada's Stewardship Agenda, which was completed a year ahead of schedule. The Agenda delivers both the national commitment for a Stewardship Strategy under the Canadian Biodiversity Strategy, and the commitment for a Stewardship Action Plan under the Accord for the Protection of Species At Risk.

The Agenda is a plan for collaboration that proposes a national vision for stewardship and operating principles. The national vision is "a nation where Canadians are actively working together to sustain our natural life support systems." The Agenda includes eight stewardship principles, four key goals, and objectives for each goal and a set of priority actions that recognise and empower stewards. The four goals are to:

- Invest in Stewardship - by enhancing stewardship program support and capacity;
- Strengthen the Application of Knowledge - by enhancing participation in stewardship, through education and awareness, and by better recognising the contribution of stewards;
- Strengthen Policy and Legislative Support for Stewards - by providing the essential economic, policy and legal tools and instruments required to support stewardship programs and activities;
- Connect Stewardship Programs - by fostering co-operation among stewardship programs, and integration with

terrestrial and aquatic approaches to conservation and sustainable use.

The federal, provincial and territorial governments will implement the Agenda through a set of Priority Actions that support stewardship initiatives appropriate for each jurisdiction. This includes improved inter-jurisdiction co-operation, a national stewardship network, the Stewardship Canada web portal, and consideration of a Stewardship Charter.

Invasive alien species

Species that have been introduced into areas beyond their natural distribution, either accidentally or deliberately, are known as alien species. These can include mammals, birds, fish, plants, insects, bacteria or other organisms. Not all-alien species cause harm. Some, in fact, are introduced intentionally to provide economic benefits.

Invasive alien species are those species whose introduction or spread threatens the environment, the economy or society. Examples include the purple loose strife, which is choking Canadian wetlands, and the zebra mussel, which has eliminated native species in the Great Lakes and clogged water lines and fouled engines, boats and piers in Ontario.

Invasive alien species are the next significant threat requiring co-ordinated action by all Canadian jurisdictions. Ministers have approved a blueprint for a national plan to address the threat of invasive alien species. The national plan will place a priority on preventing new alien species from invading Canada, as well as eradicating, containing, and controlling established invasive alien species. It will address threats to biological diversity, the environment, and natural resources that are under pressure from the increasing rates of invasion that are accompanying growth in global trade and travel. The national plan will include a comprehensive review and assessment of legislation, policy, and program capacity, needs, and gaps.

Four thematic working groups will be established to develop the plan, which will be presented to Ministers for review in fall 2003.

Biological information management

Ministers also took steps to improve the management of Canada's biological information, and reporting mechanisms on

bio-diversity status and trends. They agreed on a set of guiding principles, and will establish a national co-ordinating mechanism to act as a focal point for biological information management including facilitating the development of a biological information management strategy, which would address issues such as policies, standards and protocols.

Ministers recognised the need to co-ordinate this initiative with other similar ones, such as the National Forest Information System, and the Canadian Information System for the Environment.

Status and trends monitoring and reporting

Ministers endorsed a plan to develop a bio-diversity index and a web portal as the two main elements of a national bio-diversity reporting system. The web portal will link information on bio-diversity contained within the reports produced by jurisdictions so that status and trends information can be more easily accessed, shared and integrated.

The purpose of the bio-diversity index is to provide Canadians and decision makers with a clear, easy to understand message on the state of bio-diversity in Canada and to enable the aggregation of assessments done at the local scale into a national index.

[Source: Environment Canada]



FIJI ISLANDS

Diversities of environment stories



State of Commonwealth Environment





Diversities of environment stories

By Nina Ratulele

Take 21 countries and territories. Spread them over the 30 million square kilometres of the world's greatest ocean, the Pacific. Put in the large mountainous volcanic islands of the west. Add the small, often atoll nations to the north and east. The environment stories of this vast area are as diverse as the region.

Problems with loggers. Problems with loss of the rainforests. Problems with water. Problems with land degradation. Problems with waste. Problems with overcrowding. Problems with pollution cause problems for the reefs and coastal habitats. The Pacific islands environmental journalist has all these and much more to cover.

But across the Pacific Islands there is one story that is bigger than all the others. For it is the story of how some Pacific Islands countries could disappear beneath the waves. It is the story of climate change and rising sea levels. It is the story of today in the Pacific Islands.

It is a story the PINA Pacific Forum of Environmental Journalists takes very seriously. Our recent training efforts have concentrated on this. Through our Forum's effort a special regional workshop on the impacts of climate change was recently held for journalists from throughout the region, thinks also to support from our partners the Commonwealth Press Union.

Through the efforts of the PINA Pacific Forum of Environmental Journalists the industrialised nations of the world are also hearing, the story of what global winning and climate change means to Pacific Islanders. For we Pacific Islanders

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are convinced one of the main causes of climate change is greenhouse gas emission from the industrialised world.

The most dramatic impact of climate change and rising sea levels would be the drowning of large parts of such low-lying atoll nations Kiribati and Tuvalu.

But the impacts are being felt already. Some examples: Some small uninhabited islets have already disappeared in the atoll countries of Kiribati and Tuvalu.

The most dramatic impact of climate change and rising sea levels would be the drowning of large parts of such low-lying atoll nations Kiribati and Tuvalu.

In low-lying countries with only limited land, the rising sea levels are gradually making the soil too salty to grow crops.

As well, weather patterns have changed, with unusually severe droughts plus cyclones outside of the normal storm season.

But let us bear this story through the words of one of our members, Robert

Matau, a senior journalist who covers environmental issues for Fiji's Daily Post newspaper. He represented the PINA Pacific Forum of Environmental Journalists in Tokyo at a Symposium on Global Warming, hosted by the Suva Pacific Island Nations Fund.

He told this gathering: "Global warming is something all Pacific Islanders worry about. Let me tell you a story about how the rising sea levels caused by global warming have affected me.

"I had a great grandfather who I actually never met. But he was well known by his fellow kinsmen as a champion farmer and a respected figure on the island of Kadavu which lies south of Fiji's main island, Viti Levu.

"Over the years his grandchildren became well established in the village, which lies on the coast beside the sea. They soon became the first people to receive an education, including my father.

"Thanks to this I grew up in the city with a good education and then a good job. I never forgot my great grandfather whose efforts had made this possible. But when I finally returned to

the village to pay my respects to a great man my hopes of cleaning his grave were destroyed by the rising sea level. His grave was washed away in the sea even though when he was buried the sea was far away.

"I stand before you today not only as an environmental journalist who has covered the issue of global warming and the rising sea levels, but as a Pacific Islander who talks from experience of the consequence of tampering with the environment.

Coastal erosion, land loss, flooding, sanitation, and intrusion of saltwater into groundwater are among the issues that will affect our islands.

"The scenario I have painted for you today is a mild occurrence compared to the atoll states of Tuvalu and Kiribati. There, some islands have been devastated by freak tidal waves and rising sea levels.

"If we do not act now we may watch as Mother Nature wipes out small island nations like Kiribati and Tuvalu". Climate change is also having a major impact on the economics of our region. Already Fiji has just scraped through one of its worst droughts. Our sugarcane crop on which our economy is so reliant lost millions of dollars. There was singing and dancing in the fanning communities when the first real drops of rain fell.

"So the Pacific Islands watched with hope as the world gathered in Kyoto, Japan, to discuss the reduction in emissions. We hoped there would be serious steps taken.

"But there were many compromises. However, the focus that Kyoto brought to the whole issue was important because unless emissions are controlled in the next few years the consequences are too frightening to speculate.

"We in the Pacific are people of the sea. It is a fact of our daily life. While those loopholes of rights to trade emissions have yet to be straightened out we need the continued support and commitment similar to what Japan has displayed.

"Coastal erosion, land loss, flooding, sanitation, and intrusion of saltwater into groundwater are among the issues that will affect our islands.

"Tourism, a very important economic activity in the Pacific

Islands countries, could be affected through beach erosion, loss of land, degraded reef eco-systems as well as changes in the seasonal pattern of rainfall.

"A warmed earth could also lead to the spread of diseases such as malaria and dengue, which already have a hold in our islands.

"As the politicians and experts argue and debate, my grandfather's grave and many others around the Pacific Islands have disappeared in the sea. Unless we act it won't be just my grandfather's grave, which his disappeared. It will be the whole village of my ancestors."

PINA Pacific Forum of Environmental Journalists

The PINA Pacific Forum of Environmental Journalists grew out of a network of journalists who had attended environmental journalism training programmes run by the Pacific Islands News Association (PINA).

Countries and territories covered: American Samoa, Cook Islands, Federated States of Micronesia, Fiji Islands, French Polynesia, Guam, Kiribati, Marshall Islands, Nauru, New Caledonia, Niue, Norfolk Island, Northern Marianas, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu, Wallis and Futuna.

Main activities: Training (through workshops within the region; fellowships to study within the region and outside); developing and promoting environmental coverage; developing environmental news flow; professional fellowship and cooperation.

Partners include: UNESCO, World Wide Fund for Nature International, Sasakawa Pacific Island Nations Fund, International Centre for Journalists, Commonwealth Press Union, Pacific Community, South Pacific Applied Geoscience Commission, South Pacific Regional Environment Program.

Unsustainable farming and soil loss in Fiji

Seaqaqa in Fiji is a sugar-cane producing area of commercial importance. Sugarcane is grown here on red soils, which technically are defined as ferruginous latosol. Five years of observation of this area have revealed high rates of soil erosion and degradation on a slope of 5-80. During this period 15 to 20 cm of soil were lost over the entire site, corresponding to a loss of 34 t/ha/yr. Over the same period, soil bulk density increased from 0.85 g/cm³ to 1.10 g/cm³, while organic soil matter (expressed as a percentage of organic carbon) showed a decline from 4.43 to 3.00 per cent in the top 12 cm of soil. A matter of great concern, however, was the change in the exchangeable bases, calcium and magnesium, as the surface soil was stripped layer removed. The original soil surface layer of 8 cm had a level exchangeable bases of 17.9 m.e./100 g. The 16-25 layer which subsequently became the layer in which sugar-cane crops were planted has a level of only 1.4 m.e./100 g.

Similarly, near the western town of Nadi, where land bearing a cover of grasses, ferns and the nitrogen-fixing casuarina trees, with lithosol on an 18-200 slope, was cleared for sugar-cane cultivation, the consequences were disastrous. By the time the first crop of sugarcane had been harvested, 8-14 cm of soil had been lost. In some places, the entire solum had been removed, a loss equivalent to about 90 t/ha/yr.

The remaining lower layers of soil had far lower carbon and nitrogen levels, and higher aluminium, so high as to be toxic to most plants. In this situation, exchangeable bases did not decline, because the parent material was base-rich. At a wetter site in Fiji, a soil planted with ginger and subject to poor cropping practices showed a calculated erosion loss of 85.7 t/ha/yr.

These examples demonstrate that many parts of Fiji far exceed the generally accepted "soil-loss tolerance level" of 13.5 t/ha/yr for tropical areas. The case of Fiji typifies

what is happening in other island nations and has rarely been quantified. It shown that there is an urgent need to identify and prevent those cultivation practices and tenure arrangements which lead to these losses of a basic natural resource. It has also become necessary to develop alternate practices which are ecologically sound and could simultaneously contribute to economic gains.

Putting pristine beauty in place

Any tree removed by them is to be replaced by three of the same species; any rock moved must be restored exactly to its original location. No alien weeds or species can be introduced.

An island in Fiji is getting the treatment from an American filmmaker. In Thailand last year another film company, 20th Century Fox, made an ass of itself by messing up a perfect beach it used as a location for a story about a style of life on one. Since the natural trees and topography there didn't meet its criteria for perfection it rearranged the scenery with bulldozers and by uprooting trees.

Monuriki in Fiji is a jagged lump of volcanic rock in an azure-blue setting and garlanded with stretches of perfect South Seas beach.

It is also the retreat of species of crested iguana found in Fiji in just a few other spots and no-where else.

It was selected by the Dreamworks studio for filming a story about an American business executive anxious to drop out from it all.

When the World Wildlife Fund heard that there was some concern about the impact that the feet of a hundred filmmakers would have on the island it made some inquiries. To its pleasure it found that the company had done much to avoid the public relations disaster that the makers of *The Beach* blundered their way through in Thailand.

A local consultant was hired for a detailed environmental impact assessment ahead of filming. An environmental code of conduct agreed with local landowners was a local first. The company promised to leave the island exactly how they found it, almost. Any tree removed by them is to be replaced by three of the same species; any rock moved must be restored exactly to its original location. No alien weeds or species can be introduced.

Dreamworks deserves some sort of environmental award

but, alas, through no fault of its own it will depart Monuriki leaving it as a less than classic piece of pristine perfection.

The island hosts some hardy long-ago imported goats that have chewed away the scrub that is the habitat of the iguana for the last 30 years.

The film company offered to pay \$ 100 a head for the removal of the creature, but the landowners refused.

What a pity about that. If the goats are allowed to continue with the luxury of the location of their beachcombing lifestyle, it is estimated that the iguanas will have disappeared in about 15 years.

Impact of international events and conventions on institutional and legislative development: The case of Fiji

The United Nations Conference on Environment and Development was a watershed event for environmental policy in many small developing countries, including Fiji. As part of the lead up to this conference, Fiji developed a National Environment Management Strategy that called for the establishment of Department of Environment (DoE). The strategy also noted that the environmental laws in Fiji required a major overhaul. In 1992, the DoE was inaugurated and soon began to work on new legislation under the Sustainable Development Bill (SDB).

The DoE also coordinates activities to satisfy the requirements of the Government of Fiji as a signatory of the two conventions United Nations Framework Convention on Climate Change and the Convention on Biological Diversity. The Government of Fiji signed the Convention on Biological Diversity (CBD) in July 1993, and committed itself to developing a set of regulations to provide access for the study of its biodiversity. The process of development of such regulations into the SDB demanded continuous and sustained efforts. In order to initiate the process, an inter-ministry task force was set up in late 1993 to discuss the dimensions of regulatory framework that would be needed for bio-prospecting. From the very early stage, government saw its role as regulatory only. It would not be directly involved in bio-prospecting ventures but would attempt to ensure that they were carried out under the guidelines of the CBD and other guidelines of best practice such as the Manila Declaration.

The legislation was completed in May 1995 and put out for review as part of the Sustainable Development Bill in 1996. In the legislation, the Conservation and Natural Parks Authority with responsibility for bio-diversity conservation, controls the process of granting access to persons wishing to conduct bio-diversity research to ensure that: no ecological, social or economic harm is caused by the biological research

or exploitation; taking a biological sample does not have an undesirable impact on Fiji's bio-diversity; a fair return is provided for commercial exploitation of Fiji's biological resources; and prior informed consent from the resource owners is obtained before any collections can take place.

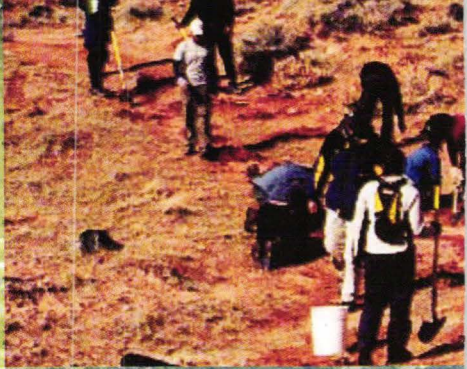
The proposed draft legislation has been praised for its vision in developing a sound basis for bio-diversity research in Fiji in compliance with the Convention on Bio-logical Diversity, and especially for placing this research in the overall framework of conservation in the Sustainable Development Bill



Tortuous ties between activists and media



State of Commonwealth Environment



Tortuous ties between activists and media

By Darryl D' Monte

A few years ago, when I was attached to the "The Times of India" in Mumbai, I wrote an editorial, criticizing Medha Patkar and the Narmada Bachao Andolan for threatening to resort to "jal samarpan" and drown themselves in the swirling waters of the Narmada. As I recall, the editorial was titled "Violence To The Cause" and I said that nobody's purpose would be served by carrying out such a threat.

Furthermore, it would undo all the good done by the Andolan over the year, which had welded together a formidable phalanx against the Gujarat government, the Centre and multilateral institutions and prevented them from proceeding with the Sardar Sarovar project. I added that Gandhiji had taught us that the ends were as important as the means and, as activists who professed to swear by Gandhi, the Andolanites should surely be aware that taking their own lives was an act of violence which could not be condoned.

The same night the editorial appeared, I received a call at home from Baroda, where the Andolan has its headquarters. It was from a sympathizer of the movement who said the activists were "disgusted" by the editorial. I listened silently and put the receiver down. The next day or the day after, my secretary informed me that there was a call from Baroda: it was from Medha Patkar. My first instinct was to dodge the call, because I was in no mood to listen to another tirade on the phone. But I figured that I would sooner or later have to face the music, so I lifted the receiver.

To my immense relief, Medha was her pleasant and cordial self. She told me, without the least trace of rancor, that she thought I had not understood the purpose of the threat and proceeded to detail these reasons at length. I replied that I respected her views but still did not agree with her position. However, we parted on very warm terms, as we had always done in the past.

NGOs often expect that the media, or at least some sections of it which are seen as sympathetic, should stick unswervingly to their cause, come what may. Obviously, in this specific instance, the "fellow-travelers" were guilty of being swayed more than the leader herself -- who would have probably put her own life on the line first, had it ever come to such a pass.

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I recount this incident at some length because I think it helps to illustrate the often-tortuous relationship between activists and the media. The Andolanites had become too emotionally involved in a literally life-and-death struggle to realize that it was unfair on their part to expect a journalist, who was otherwise seen as sympathetic to their cause, to

endorse their stand uncritically. It was entirely possible that I was wrong, or I had not been fully apprised of some valid reasons for resorting to this extreme action, but I had every right to make up my own mind as an independent professional.

NGOs often expect that the media, or at least some sections of it which are seen as sympathetic, should stick unswervingly to their cause, come what may. Obviously, in this specific instance, the "fellow-travelers" were guilty of being swayed more than the leader herself -- who would have probably put her own life on the line first, had it ever come to such a pass. Medha displayed the true qualities of leadership by putting aside any personal animus and trying to convince an editor of her point of view in a cool, contained and collected manner.

On the issue of Sardar Sarovar itself, let me explain the contortions that I had to go through as an editor first and an environmental journalist second. Once around a lakh of people from Kutch (and possibly Saurashtra, which are the two thirstiest regions which were supposed to receive water from the dam reservoir) staged a morcha in Mumbai in favor of the project. I published a four-column picture of it on the front page. Some Andolanites were aghast. They phoned me and asked: "Darryl,

what are you doing?" My reply that it was something that had occurred in the city, was unprecedented, therefore 'news', and could not be ignored, did not cut much ice. They assumed I think that this was a journalist who had sold his soul to a big establishment paper and had crossed over to the other side!

I wrote the editorials on all environmental issues in the paper. The editor in chief would let me, by and large, define the position of the paper on all these issues and not interfere with my viewpoint. I was opposed to the project. However, I placed myself in the 'mind' of the leading newspaper of the country and took a centrist but liberal view on the controversy. I argued at one stage that too much money had already been spent on the dam; it was a fait accompli. Therefore, it would be better to accept that it would be built but there was no reason why its height could not be reduced to diminish the submergence that it would cause, and thereby the displacement of people (mainly in Madhya Pradesh and next in Maharashtra). These views appeared as those of the newspaper, since they were unsigned.

I also wrote articles on Sardar Sarovar in the editorial page of the paper, where I argued against the dam much more vehemently and pointed to the problems of rehabilitation, the displacement caused in addition by building the feeder canals, and so on. I then listed the alternatives that there were to the project.

All these three positions -- sheer objectivity when it came to news, a compromise when it came to editorials and independent opinions when it came to signed articles -- were consistent with my role as a professional journalist, albeit one who was committed to protecting the environment and upholding human rights. Nevertheless, I received a great deal of flak from both sides. As I mentioned, the activists believed that I had sold out. Their worst fears appeared to be confirmed because I refused to speak on public platforms against Sardar Sarovar, unlike when I had been a freelance journalist prior to rejoining

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"The Times". Like Caesar's wife being beyond suspicion, an editor had to be seen to be fair and neutral.

On the other hand, the Sardar Sarovar Nigam and Gujarat government used to rail at the fact that the Mumbai editor of this newspaper was "biased" against the project and, they inferred was distorting both news and views on this tricky subject. In Gujarati those days, as probably now, it was virtually impossible to publish anything against the dam, which people saw as their lifeline. When an "Indian Express" reporter in Mumbai once wrote something critical on the project, his story was translated into Gujarati for the group's sister newspaper to imply that he was in favor of it!

Before I rejoined "The Times" and even during the five years I edited the edition, I was variously described --is I am still -- as a journalist and an environmentalist. I would, however, prefer to be described as an environmental journalist, because that it is the correct depiction of my role. It is to report and analyze developments in what may broadly said to comprise environment and development issues. Now that I am once again a freelance journalist, I do not have the same objection to appearing on public platforms. At the same time, I do realise that speaking at a meeting called by activists who oppose a particular project can on occasion block my access to the other side and thereby circumscribe my role as an independent professional.

Some 15 years ago, I traveled with the fiercely independent journalist, Bahrain Dogra, to the Tehri dam site in Garhwal. We stayed with V.D. Saklani, the aging lawyer from old Tehri town who is the strongest opponent of the project. I then told Bharat that we should meet Jaiprakash Engineering Co (if I recall the name correctly), which was building the dam. He refused, saying he saw no point in meeting the firm, because he was only too well aware of their viewpoint. I respected his stand, but I personally disagreed with it, and went to meet the dam-builders on my own. In my experience, meeting the "opposition"

To complicate matters, many activists are themselves journalists. The classic example is Sunderlal Bahuguna, of Chipko fame, who used to string for a national news agency. How objective would an editor expect his reporting to be?

serves several purposes. It defuses the criticism that a journalist's mind has been made up; it also enables the journalist to be fair by reporting, or at least listening to, the other point of view. What is more, the "opposition" often destroys its own case by presenting facts and figures that can be used against it.

The fact is that NGOs and the media have different though often converging, agendas, and each must respect the other's autonomy. To begin NGOs first, they have legitimate reasons to criticize the media for only wanting sensations stories, or only being interested in personalities and events, not processes. Scribes don't do their homework half as

well as they ought to, particularly when it comes to technical, complicated environmental issues, like CFCs and pollution-related stories. Journalists tend to swallow what officials from state-run institutions or the private sector tell them uncritically and regurgitate these ill-digested facts dutifully. Many are also loath to travel to remote, difficult terrain to see situations first-hand, because of the lack of creature comforts they get accustomed to by being pampered by the establishment. Their interest in any issue is also difficult to sustain; even if reporters are keen to follow up stories, the desk and editors keep warning them not to get involved in campaigns.

On their part, scribes complain that the NGOs expect them to keep writing about an issue even when there is no "story", as perceived by the journalist. To add insult to injury, some NGOs -- including some one-man outfits! -- grossly exaggerate threats to the environment, which are figments of the activist's own imagination. When I studied in detail the danger to the Taj Mahal from the Mathura refinery for a book I wrote a decade ago, I found to my dismay that Prof T. Shivaji Rao from Waltair University kept raising completely unfounded fears about the emissions from the refinery, which were duly reported in the press. (In Athens, which is the city whose monuments are most endangered by pollutants in the air, the head of an NGO who was up to similar tricks was jailed briefly for his misdemeanors!

The fact is that NGOs and the media have different though often converging, agendas, and each must respect the other's autonomy. To begin NGOs first, they have legitimate reasons to criticize the media for only wanting sensations stories, or only being interested in personalities and events, not processes.

NGOs feel that they often get a raw deal at the hands of the press, which misreports their activities. The Delhi-based organization called "Charkha" seeks to correct this by getting activists to write articles, which are then edited by people with journalists' skills and sent to newspapers for publication. I have attended meetings in Mumbai and Chandigarh called by Charkha, where I have expressed my sympathy with their complaints about the way in which the conventional media functions but disagreed with the solution they opt for. In my view, no editor will take anything written by an activist, as being objective and most articles will be rejected. At best, something written by an activist may be published on an "Op-Ed" page -- opposite the editorial page, which represents the paper's opinion, with the author's designation at the end to inform readers of the possible bias.

To complicate matters, many activists are themselves journalists. The classic example is Sunderlal Bahuguna, of Chipko fame, who used to string for a national news agency. How objective would an editor expect his reporting to be? Instead of blurring these roles, it would be best for NGOs and the media to keep a healthy distance from each other. Only this can ensure that each plays its own, distinct, role properly. It is as well that in Mumbai, journalists and activists are to hold workshops on specific issues like the displacement of people by projects to come to a better understanding of their respective functions. This should trigger off an ongoing dialogue, with a free, frank and fearless exchange of views, which can then be circulated to and replicated in other towns and cities throughout the country.

Plant Varieties Act of India

The aim of the Plant Varieties Act (PVA) of India is "to protect the rights of the developers of new varieties to stimulate investment in plant breeding and to generate competitiveness in the field research and development both in the public and private sectors with the ultimate aim of facilitating access to newly developed varieties and maximising agricultural production and productivity in the country." Further, the PVA states that "that protection of farmers and researchers rights will strive to balance to need for stimulation and inventive R&D with welfare of the farmers."

The proposed PVA reflects the conflicting pressures between the introduction of plant variety protection driven by developed countries and the strong opposition by farmers against introduction of any form of intellectual property protection in the agricultural sector.

The PVA includes features of the International Union for the 1991 Protection of New Varieties of Plants (UPOV), which sets the minimum standard for plant breeders right (PBR) protection for contracting states. Most contracting countries are implementing the 1991 act into their national laws. The Indian PVA includes elements of both the revised act of 1991 and of the former act of 1978, and has introduced some new features.

Defying the desert

Drought plagues Rajasthan State, but one region's traditions have saved the day

By Patralekha Chatterjee

Rippling streams and lush green fields are hard to find in Rajasthan, a desert state in India's north-west perhaps best known as the site of the country's nuclear tests. A drought here and in several other states has caused a shortage of drinking water and threatens 50 million people. Yet driving through the hilly Alwar region, something of a miracle is evident. Here the wells are not dry and women in traditional long skirts thresh wheat in the fields green with life.

It was not always like this. Ten years ago, all around was barren land. Poor, hungry families packed off their men to cities to sustain themselves.

"I left my village as a young lad. There was no water and no work in farms except when we had a good monsoon," says Roopnarayan Sharma, a resident of Kakdali Rampura village in Alwar. Sharma came to Delhi and started selling Chaat (a north-Indian snack made out of flour) in a narrow lane in Khari Baoli, a crowded quarter in the old city. It was not an easy life--standing for hours on end by the wayside, with a brass pot in his hand and a steel container perched on his head, waiting for customers to come by -- but Sharma, like others who migrated from the parched countryside to the big city, had few options.

"Wheat was seldom seen in these parts. Today, I get a yield of almost 40 quintals per hectare," he says. That, when Alwar has been reeling under a semi-drought condition for the last three years. That has worsened considerably this year, yet Alwar continues to thrive.

"In the night, I slept in a little shack with a hot, tin roof. I longed for the warmth of home and family. I often wished that I would drop down dead-- or escape somehow," he recalls.

The years and the harsh life have taken their toll. But today, the 45 year-old craggy faced Sharma is a cheerful man. He returned home seven years ago buoyed by stories of the recharged wells and dead rivers coming alive. The ground-water table has risen sharply. The

hills, once bare and brown, are green and there is work in the fields.

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Locally based success

Alwar provides a lesson. But the secret of its awe-inspiring feat is disarmingly simple. The government has not pumped in vast sums of money. Nor are there large dams of irrigation engineers pottering around.

The water revolution rejuvenating dead rivers, recharging wells, and morphing the so-called 'dark zone' of the seventies into one of the brightest spots on the map of India's parched regions is a community effort. The villagers did it themselves supported by a local volunteer organisation called Tarun Bharat Sangh (Indian Youth Association).

The change agents are the Johads, small crescent-shaped earthen dams used to harness rainwater and bring to life wells and rivers in this parched land. Johad is basically a village water tank and was the traditional system of water storage for lean periods in several parts of India. They are erected and maintained by those who directly benefit from them.

In Bhaonta and other village, men and women still talk animatedly about how each family worked from the early hours till dark to build the small and medium sized dams, which have transformed their lives. Even small children helped. They carried bags of stones to the construction sites. The villagers are so proud of the greenery around that they socially boycott anyone caught felling trees or cutting branches.

"Reviving the traditional systems, including Johad, has met with limited success in other parts of the country, primarily due to

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In the years to come, with a rapidly rising population and changing lifestyles, India's need for fresh water is likely to go up dramatically. The intense conflict among competing users-agriculture, industry and domestic sector-is already driving the ground water table deeper and deeper in the country, warns UNICEF in a report titled "Emerging Fresh Water Crisis in India".

resistance from the entrenched bureaucracy. In the absence of a clear-cut policy on traditional systems, most efforts to rejuvenate them have been thwarted by vested interests," points out a report by the UN Inter-Agency Working Group on Water and Environmental Sanitation, which looked at the revival of the Johad in Alwar.

Defying the drought

In Bhaonta-Kolyala, a neighbouring village, Dhapa Devi, an elderly woman breaks into a giggle talking about the changes in the family's diet. "Once, there is water, there is everything. This is the good life. Our men stay with us and we eat tasty food." Earlier, a typical meal consisted of the traditional bread with just chillies mashed into a pulp.

Now, there is piping hot broth of lentil and yoghurt and vegetables. Fodder is not a problem any longer and villagers say the milk yield of the cattle has gone up sharply. Dhapa Devi proudly says her family eats as much yoghurt and whey as they feel like.

The magical transformation of this arid landscape has become a talking point among water experts and environmentalists in the country faced with a looming water crisis and a population reaching the billion mark.

[Sources: Encarta, UN Convention to Combat Desertification, Infoplease.com, MSNBC research]

In India, researchers estimate that water is being pumped from the ground at double the rate of aquifer recharge from rainfall. The international Water Management Institute estimates that India's grain harvest could be reduced by up to one fourth as a result of aquifer depletion. Rajinder Singh, a bearded man in his forties and secretary of the NGO Tarun Bharat Sangh, was the catalyst in motivating villages to renew their traditional water harvesting practice. Today, he says, the villagers from Alwar are

invited by residents of villages in other water scarce regions in India to share their experiences.

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But Alwar's villagers who have showed the way remain robustly optimistic. "When I was a 15 year-old boy, we had only one well- just enough for drinking water for the family but not to grow vegetables. I remember feeding cows and buffaloes with tree barks. Fodder was hard to find. And whenever there was a drought, we walked 50 kilometres (30 miles) downstream to get feed for the animals. Today, I am 35 and life has changed for the better. I believe in miracles," says Ram Dayal Gujjar.

Devolution of power and environmental regulation in India

The constitutional amendments in 1992 that became operational in April 1994 provided for the devolution of power to democratically elected local governments. The local governments for the villages (Panchayats), towns and cities have been empowered to undertake environmental activities such as soil conservation, water management, social forestry, water supply, public health and sanitation and solid waste management etc.

Devolution of powers for environmental regulation among three levels of government (Central, State and Local) is intended to enhance participatory planning, and to reduce the cost of regulation, as well as reduce bureaucratic delays uncertainty in implementation and monitoring. However, in a free and growing market economy, there is a risk that it may contribute to unnecessary competition among the jurisdictions through the relaxation environmental regulations to attract more business and investment.

The effectiveness of implementation of environmental laws and the degree of compliance by polluters varies significantly among the states, leading to instances where different State agencies have taken decision over similar environmental issues. For example, the Government of Tamil Nadu allowed the establishment of a chemical industry (Nylon-66) while the Government of Goa rejected such a proposal. Similarly, a number of polluting industrial units was closed down in the capital city of Delhi, but were welcomed by the neighbouring States. These examples indicate a lack of co-ordination among the State agencies. In response, the Central Pollution Control Board through the Minimum National Environmental Standards (MINAS) has put an important safeguard against relaxation of norms in place. The State Boards can only make these standards more stringent if the local environmental conditions demand, but in no case can they make the local standards less stringent than the MINAS.

The Indian case points out that while devolution of power leads to good governance, it also demands establishment of checks, and balances through a mix of central and state regulations to avoid potential harmful inter-jurisdictional competition in the implementation of environmental regulations.

Dying wetlands of Assam

By Nava Thakuria

Wetlands in Assam are dying. Reported in a survey conducted jointly by Assam Remote Sensing Application Centre (Guwahati) and Space Applications Centre (Ahmedabad), has also revealed that almost one third of the wetlands in the state are shrinking rapidly. The survey revealed that Assam has 3, 513 number of wetlands covering an area of 1, 01, 231.60 hector, which is the 1.29 % of total geographical area of the state (78, 523 sq km). The inland wetlands of Assam includes swamp and marsh (total area covered 43, 433.50 ha), water logged (23, 436.50 ha), lake and ponds (15, 494.0 ha), ox-bow (15, 460.6 ha) and reservoirs (2, 662.5 ha), where Morigaon district claimed highest wetland covered area up to 11, 658.0 ha and Hailakandi district with lowest wetland area 840.0 ha only.

It may be mentioned that rapid urbanisation and other developmental activities have put tremendous pressure on all the surviving wetlands in the state. Wetlands, which is defined as the area of marsh, fen, peat land and water, may be static or flowing and temporary or natural, but with lower depth, are the habitat of around 15 per cent of all living organisms on Earth and those are very rich in bio-diversity. Aquatic animals like turtles, crocodiles and different kinds of fish are completely dependent on the wetlands. More over, wetlands are the home of many rare and endangered species.

Wetlands are also recognised as highly productive. Wetland plants like rice, water chestnut, lotus etc are used by human being as food. At the same time, fish and prawn are turned out to be the important food resource. Similarly jute, cane, reeds, cattails, grasses are known as the most useful item for the people. Wetlands also play a significant role in flood control as well as aquifer recharger, retaining excess water during rainy season. Many times those remain as the

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The Ramsar Convention on Wetlands that came into existence since 1982 in India declared; Chilka Lake in Orissa, Wular lake in Jammu & Kashmir, Harike in Punjab, Sambhar in Rajasthan, Ujini in Maharashtra, Ashtamudi estuary in Kerala, Kolleru in Andhra Pradesh, Upper Lake in Madhya Pradesh, Nal Sarovar in Gujarat, Kabar in Bihar, Sukhna in Chandigarh, Renuka and Chandratol in Himachal Pradesh, Kanjli and Ropar in Punjab, East Calcutta wetlands in West Bengal, Deepar Beel in Assam, Logtak in Manipur etc, as of national importance.

Leaving aside Deepar Beel, Assam contains some strategically important wetlands including Dhir Beel (Dhubri district), Tamranga and Dalani Beel (Bongaigaon), Mori Kolong and Patoli (Nagaon), Mer Beel (Golaghat), Son Beel (Karimganj), Roumari Beel (Darrang), Garampani and Umrangsu (NC Hills), Gaurisagar and Joysagar (Sibsagar) etc.

It is reported that one hectare of wetland in the state can produce over 100 kg of fish per year in its natural condition, which reveals that Assam alone can produce sufficient quantity of fish per year to feed the entire north eastern region of India. So preservation of wetlands deserves attention for both ecology and economy of Assam.

"Over 1350 inland wetlands in Assam are suffering due to invasion by aquatic weeds. The other reason behind the shrinkage of wetlands varies from extensive soil erosion and inflow of silt to the disposal of domestic sewage and industrial effluents," told Prof. D.C. Goswami, who was associated with the exercise and guided the survey. Prof. Goswami, who is also the head of the department of Environmental Sciences in Guwahati University, expressed anger that the wetlands in Assam had virtually become the wastelands. Also disclosed Goswami that, the most of the wetlands were surviving with tremendous pressure created by human aggression.

"Need of the hour is proper awareness among mass people for protection of the wetlands. The dependant communities on wetlands must be involved in this process for developing indigenous management practices that would finally help in sustaining the wetlands in the state," told Shamima, a Guwahati based environmental activist of Assam.

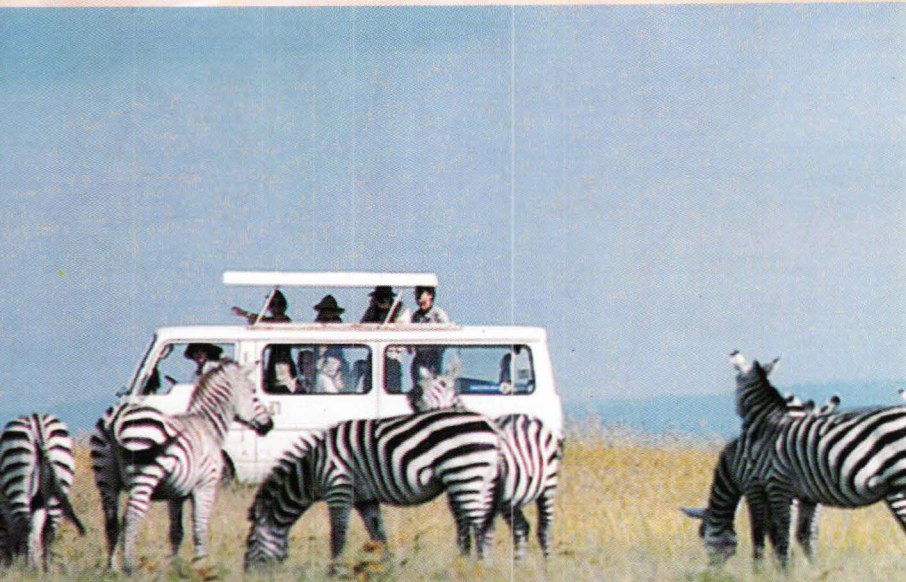


KENYA

Time to recycle story



State of Commonwealth Environment



Time to recycle the story

By Robert M Kihara

Kenya is located in Eastern Africa, the Indian Ocean borders it on its eastern coastline, Somalia borders it to the northeast, Ethiopia to the north, bit of Sudan on the northwest, Uganda to the west and Tanzania to the south.

Kenya's total land area is 582,650 sq km, of which land covers about 569,250 sq km and water the other 13,400 sq km. Kenya has a coastline of 536 km and has maritime claims of 200m depth and an exclusive economic zone of 200 nm (nautical miles) and 12 nm of territorial waters.

Climate: The climate varies from tropical along the coast to arid in some interior parts. The terrain is low plain rising to the central highlands, which are bisected by the Great Rift Valley and fertile plateau to the west.

The lowest point is the sea level of the Indian Ocean and the highest point is Mount Kenya, which at 5,199 m is Africa's second highest mountain after Mt Kilimanjaro in Tanzania, along its border with Kenya.

Natural resources: Includes small amounts of gold (not of significant commercial value) and limestone, soda ash, salt barytes, rubies, fluorspar, garnets and wildlife.

Land use: Arable land takes up 7 percent, permanent crops 1 percent; permanent pastures 37 percent; forests and woodland: 30 percent. Other use taxes up 25 percent - urban settlements/water etc.

Irrigated land: 660 sq km (1993 est.)

Natural hazards: Recurring drought in

Kenya entered the new millennium with the government setting high-sounding goals for industrialisation by the year 2020. Those goals have been set at a time when the country's economy is reeling under a government-implemented programme of economic liberalisation and reforms.

northern and eastern regions.

Environment: Current issues of environmental and media concern are water pollution from urban and industrial wastes; degradation of water quality from increased use of pesticides and fertilisers; deforestation; soil erosion; desertification and poaching.

Kenya is party to the following international agreements that relate to the Environment: Bio-diversity, Climate Change, Desertification, Endangered Species, Law of the Sea, Marine Life Conservation, Nuclear Test Ban, Ozone Layer Protection, Ship Pollution, Wetlands. It has signed and ratified the above agreements.

The Kenyan Highlands comprise of one of the most successful agricultural production regions in Africa. There are glaciers on Mt. Kenya and the Nyandarua Mountains (known as the Aberdares). These support abundant and varied wildlife of scientific and economic value in addition to being the main source of rivers that supply a large proportion of the population in Central, Eastern, Nairobi and parts of Rift Valley with drinking water. According to estimates of July 1998 the population was about 28 million. The world's second largest fresh water mass, Lake Victoria straddles Kenya's border with Tanzania and Uganda and is a major source of fish exported by Kenya.

Curbing air pollution in Kenya

Kenya entered the new millennium with the government setting high-sounding goals for industrialisation by the year 2020. Those goals have been set at a time when the country's economy is reeling under a government-implemented programme of economic liberalisation and reforms. Steps have included the removal of import licensing and price controls, removal of foreign exchange controls, fiscal and monetary restraints, and reduction of the public sector through privatising publicly owned companies and downsizing the civil service. Growth has slowed for the last two years as The World Bank and IMF continues to withhold aid amid growing concerns over high level corruption. Long-term barriers to development include electricity shortages, the government's continued and inefficient control of key sectors and endemic corruption, and

the country's high population growth rate.

But let alone such lofty goals and the impediments to development Kenya, like most other developing countries, is also beset with environmental problems -- air pollution being on the rise by the day with an increase in vehicles emitting fumes and industries spewing black smoke. And unfortunately, there is virtually no effective means of curbing the rising air pollution. Unabated depletion of forests and lack of other key determinants of better air quality further worsen the situation.

In Nairobi, Kenya's capital of two million citizens, air pollution, especially from automobiles, is rapidly increasing. Carbon monoxide emitted from cars and other motor vehicles contribute significantly to the substantial increase in asthma cases. Leaded petrol is what runs in most of these vehicles that contribute to the ever-increasing health hazards faced by the city residents. Poverty of thought among leaders and of material among the populace combine to make such issues as air pollution secondary to everyday life of leaders and the led.

Though Kenya's industrial base is at its infancy, efforts at setting up factories are uncontrolled and they rarely go through the process of environmental impact assessment (EIA). Little attention is paid to disposal of industrial waste in Nairobi and such outlying industrial hubs like Thika and Athi river towns. To quote journalist Julius Mokaya, writing for Kenyan Prospects, a publication of the World Bank Institute: "From the point of the national economy, the dream of industrialisation is being negated because industrial waste is not properly disposed of.

In Athi river town, a leading cooking fat processing plant, leather tanning factories and a fish processing plant have effectively shut out potential investors because of their untamed environmental pollution. They have turned the town into a foul smelling, virtually uninhabitable place." The discharge of industrial waste into Athi river has affected crops, an area leader complained.

Thika town, about 30 kilometres from

"From the point of the national economy, the dream of industrialisation is being negated because industrial waste is not properly disposed of.

To fight air pollution, the media in Kenya needs to galvanise action by citizens' groups, the government and industries to halt dangerous emissions and ensure that laws to curb these are adhered to or drawn.

Nairobi, has not been spared. Residents of Makongeni estate have developed breathing problems as a result of fumes emitted by a chemical factory, Kel Chemicals. Despite spirited opposition to this plant years back, little has been done to curb the harmful fumes. The factory produces sulphuric acid, technical batteries and other substances. Workers at the factory say prohibitive costs of proper water and purification systems hamper any efforts to help the people in surrounding areas from being affected by the harmful effects of air pollutants.

To fight air pollution, the media in Kenya needs to galvanise action by citizens' groups, the government and industries to halt dangerous emissions and ensure that laws to curb these are adhered to or drawn. The Kenyan Environmental Journalists need to help enlighten citizens that clean air and the eco-system that supports it is their birthright. Education and advocacy activities spearheaded by the media are crucial to help in the campaign against air pollution. Information on the dangers of burning fossil fuels such as oil should be provided so that alternative sources of energy which cause less pollution are encouraged and developed.

Forests, which contribute to better air quality, should be conserved and protected rather than be depleted recklessly as is being done in Kenya today. Whether trees are cut, burned and left to rot, carbon dioxide is released into the atmosphere and the ability of trees to absorb carbon dioxide is lost. In Kenya's capital where controversy has been raging between environmental activists and the government activists opposing land allocations to private interests in suspicious circumstances have restated that Karura Forest on Nairobi's outskirts precisely functions as the city's lungs and its destruction will virtually mean destroying Nairobi's health. Another forest targeted by developers, Ngong Forest, seems for the moment to have escaped the jaws of land-grabbers -- thanks to the pressures from some citizens action groups. For a growing city like Nairobi, any forest cover available should be enhanced and protected and the media should highlight the link between

increase in respiratory diseases and air pollution.

Environmental journalism in Kenya:

Time to recycle the story?

One of the major hallmarks of the environmental clean-up effort world-wide is that Environmental Recycling has become a major employer and ally. It is a lesson that should not be lost on the environmental journalist. In the age of the computer, we have come to associate this technological tool with the renewed capacity it has over the items it replaced - paper, pen, typewriter, desk, and trash bin.

Many newsrooms in many developed countries, however, still spew out lots of paper. For the journalist whose work does not see the light of day, the trash bin is usually the destination. Should the journalist dig further and seek to have the story see the light of day, he has to polish the language, refine the facts and be more objective. He has to make his story newsworthy. This is tantamount to a recycling process. Otherwise, the journalist can at least take joy that a recycled paper manufacturer will best utilise his paper article.

"From the point of the national economy, the dream of industrialisation is being negated because industrial waste is not properly disposed of."

In most computers, however, there is a trash bin symbol and in keeping with modern trends it is depicted by rectangular arrows showing the rejuvenation process of conservation. Here comes the comparison - just like the editor who can deep into the trash bin in the newsroom, so can you at least for sometime retrieve information from the icon on the computer to give it a new lease of life.

This is what I believe Kenyan environmental journalism should do - look at itself afresh and give itself a jolt of life. A rejuvenation, a recycling of sorts. The Kenyan media, just like the environmental movement after Rio, seems to have let the agenda-making shift from it and should try to grab the initiative again to aspire for greater, focused goals and achievements. After all, even the unwavering Green peace, which never seems to go out of steam, also does some occasional restructuring.

The desire here is not to discount the successes that the Kenyan

There are remarkable, effective efforts by the few journalists who are doing a lot to keep the environmental story alive. These have given a good measure of coverage of environmental issues in both print and electronic media in Kenya, though the downside is perhaps I expect that them to be more of overt activists.

media has shared in. No, that would be too harsh, though quite tempting. I held initially thought of equating the state of Environmental Journalism in my country to the garbage heaps that litter its capital city, Nairobi - the less the mounds, the more effective the media! However, I decided that would be diversionary.

There are remarkable, effective efforts by the few journalists who are doing a lot to keep the environmental story alive. These have given a good measure of coverage of environmental issues in both print and electronic media in Kenya, though the downside is perhaps I expect that them to be more of overt activists. Before

blaming the journalist for the garbage mound, I told myself, point at the government that collects taxes for this purpose and fails to deliver!

Rejuvenation is no mean task confronting us on our watch of planet earth. Like in most parts of the world, the ugly face of social neglect and environmental degradation in Kenya seems to rear its head when the garbage heap or the extremes of environmental degradation build in our neighbourhood. Then typically, the media raises the call to arms. The hue and cry is heard when the rot stinks, but rarely so when the first polythene bag of garbage is dropped. The media should recycle itself into a prevention movement not into a cure movement.

The success?

To get a better grasp of the Kenyan Environmental Journalist, I will delve into the story of Karura Forest, a habitat of indigenous trees on the outskirts of Nairobi. It is the story of what the media can do for environmental awareness. One evening, late last year, as Nairobi residents were glued to their TVs at primetime news, Linus Kaikai, a Kenyan TV journalist from a private station, the Kenya Television Network, appeared on screen to inform the residents that prime forest land was being destroyed right under their noses.

As the cameras rolled, we could see workers with saws and construction equipment in the background purring, clearing

and destroying highly valued indigenous forestland for a housing project. The cameras rolled on informing us that Karura Forest was being cleared by the behemoth of the kind referred to in Kenya by a private developer, the kind that should be aptly referred to as environmental destroyer, the kind of eco-criminal. Normally the land that such eco-criminals chop up and feast on is dubiously acquired in a process of little public scrutiny and transparency. This breed of Kenyan eco-criminal targets precious forestland, public parks and children's grounds and at the highpoint of greed, public toilets. In other words, the word public is an anathema to this breed. Wherever he or she sees public land, he/she wants to transform it into private. This is the kind of breed that Linus Kaikai was exposing that evening as he sought to wake up the public from its slumber as its property was being 'privatised'

The government had some years back when journalists were in their slumber degazetted the land and given it to wheelers and dealers in the political system. After bidding their time, some of the beneficiaries sold the land to third parties, possibly with the knowledge that the forest was a hot commodity, to be sold off to unsuspecting prospectors. As they set to build houses on prime property (the garbage heap grows into mountain...) the journalist saw what had come to light and blew the whistle. This activity was mockingly taking place just behind the headquarters of UNEP.

In the follow-up to this story, environmental activists and human rights groups took up this humble initiative which to this day continues to cause ripples. Soon after, under the glare of TV cameras, protesters invaded the construction site, destroyed and set ablaze Caterpillar tractors and structures housing the construction gang. The nature of the protesters' action became subject to other debate as to whether they were justified in using violence against what they deemed to be a bigger injustice.

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Since then, the protest movement headed by Kenya's top environmental activist, Wangari Maathai, has had stand-offs with the government as they stage numerous attempts to storm Karura Forest to plant trees while the government says it has a duty to safeguard private property.

Quite some irony since the forest was initially public property, which was irregularly allocated to politically connected individuals. When early this year thousands of university students marched into the site and briefly forced their way in aboard a tractor, the media too was there and the skirmishes which followed showed the brutality of anti-environmental forces.

Students were bludgeoned, and police in blatant contravention of international law followed those who rushed into the UNEP compound to seek haven there. The police assaulted them within the UN premises. The images of a female student writhing and brooded on the ground in the UNFP compound after beatings by the police showed just how ruthless, destroyers of the environment could be. This evoked widespread condemnation including from the UNEP, Executive Director.

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Other attempts to march to, the forest have been blocked by police, though the violence against the protesters has not occurred to the previous scale. While the media brought this environmental story to public attention, as in many instances, the story has since been become a 'political story'. The image of Wangari Maathai, whose beating at one of the protest marches evoked condemnation by none other than the UN Secretary General, is seen as that of the moving force representing opposition to a political system that is abdicating its role of being the custodian of the Citizen's environmental heritage.

The stolen story

Kenya is a tale of land grabbing and greed by influence peddlers in the corridors of political power, for these,

eco-crimes low in their worries. And when the story is written, it is not an environmental story, it is a greed story, the media hits at this maddening greed of our times, but rarely sustains this link to deprivation of natural resources from the majority by the minority.

The Environmental story in Kenya continuously dies at the whims of the political and economic story. It is a side show, a sidebar. It is rarely linked to the peoples' environmental rights. Prime beach plots were long ago allocated to political wheelers and dealers who sold them off to moneyed non-indigenous Kenyans. The result: a Kenyan whose ancestry stretches back in time can be accused of trespass while trying to access prime beaches now a private property. He cannot see, wash or dip into a natural resource, nor sample the salty water in the best areas bequeathed him or her by his ancestry. In Mombassa, Kenya's main port even trying to retain the public beaches in prime locations has been one of the few battles the media rises to on the rare occasion.

Some beach plots or public parks have been allocated to churches, which unashamedly hold their deeds as if in mockery to the environments right of the citizenry. So too has part of City Park in Nairobi been allocated and a temple put up which was featured two weeks ago as one of the biggest in Africa. This is the untold story - hidden from public view, hidden from public scrutiny, possibly because it won't sell though it squeezes its endangered head in the media pages.

The way ahead

The media has to educate its own, eradicate the ignorance of the correspondent, the sub-editor, the reporter and the editor. It is a torturous process but we cannot be complacent by saying we have pullouts and radio programmes if the media is not linking the every day suffering of the citizen with his poverty and the misdeeds of eco-criminals. That is why we train, teach and invite people from environmental bodies and journalists to our forums to share ideas.

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There is need to strengthen and network and share ideas among the media and stakeholders in society, citizen action groups and many others. These can do a great deal to unlock the social conspiracy, which waits dumping of hazardous waste another Bhopal.

The media needs to form regional (international) and international ties to give direction and even sometimes spur public action through its own campaigns to achieve better environmental management. From our backyard, the MDA is proud to have even facilitated the formation of another journalists

association for correspondents, the Kenya Correspondents Association (KCA) to enhance their welfare and enable them to articulate the views of the people with more vigour and confidence.

As a grouping of journalists in Dhaka, we should co-operate further and even set up regional chapters/functions and networks to foster environmental reporting. Despite Kenya being home to UNEP, the grabbing of prime indigenous forestland and attempts to build a housing estate on it and the vigorous public outcry is occasionally taken to mock the presence of such an organisation in the country. Definitely if not so, it serves to stir the awareness of the people to the significance of this institution by their spirited defence of the sanctity of nature.

The media has alerted the public and the donors who give government money that it goes to oil the engines of a corrupt machine out to denigrate the environment. The media highlighting of eco-crimes in Kenya is most effective as an alarm rather than a surgeon. The media needs to be the surgeon removing the contaminant anti-environment figures who for example a few years grabbed thousands of acres of the Tana Delta Wetlands Reserve for some warned shrimp project only for the outcry thereafter which led to suspension of the project.

Yes, the media should continuously spur community

involvement .The Kenyan media needs to tell the citizens they too are custodians against unplanned garbage disposal, contamination of the now clinically dead Nairobi River which straddles the capital and the need to seek alternatives to polythene and the canned drink menace. All these which threaten to drive the ignorant citizen back to the dark ages with the warped logic of modern living through the soda or beer can.

After Rio, have we run out of steam?

We need to bring the steam back after Rio. The big environmental story in Kenya is yet to be told. Poverty, politics and its diversionary tactics have confined it to the newsroom trash-bin. We need hope not despair in the recycle bin, pluck out this story and give it justice. Few are the messengers - committed, aware and determined to put it on the front pages - but still they are holding fort, hoping for new recruits and volunteers. The media houses should begin this recruiting mission and the MDA and others will supplement it, for there is a story out there still waiting to be told.

River water users unite in Kenya

By Michael K. Thomas

River Water Users Associations (RWUA) can play to enable the stakeholder communities to have an active role in the management of the river water resources on which their livelihoods depend. Managing the river water resources of Kenya is the responsibility of the Department of Water Resources (DWR), in the Ministry of Environment and Natural Resources (MENR). Managing the resources involves, among other activities, monitoring the resource availability, assessing the resource potential, allocating the resource to those that want/need to use it, and ensuring that users adhere to allocation decisions.

During the last decade the financial budget available to DWR to manage the river water resources has declined. This has meant that there have been fewer funds to mobilise hydrologists and water bailiffs to undertake field-monitoring exercises. At the same time, domestic, livestock and irrigation demands for river water resources have increased substantially. Additionally, access to the rivers has increased dramatically due to settlement/subdivision of riparian land, meaning that the number of commercial abstractors has grown dramatically.

Furthermore, awareness has increased in regard to the commercial value of water, specifically for irrigated horticultural and floricultural activities. The absence of tight government control has effectively provided an open access condition in which water abstractors have abstracted on a "take as much as possible" basis.

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The net result is that rivers that once were perennial have become ephemeral (seasonal), for example the Naro Moru (Tigithi) River. Downstream communities are forced to seek alternative water sources, which may be of poorer quality, thereby increasing

health risks, and/or further distant, increasing the labour and cost required for fetching the water. This is an economic cost caused by poor management of the river water resources that is frequently overlooked.

Downstream affected communities used to think that drought was the cause of the lack of river water, but nowadays, these same communities have become more aware that upstream abstractors are the cause of their reduced river flows. In situations where ethnic, language, and lifestyle (pastoral or agricultural) differences reinforce the divisions between upstream communities with water and downstream communities without water, the potential for tension and conflict is enormous.

It must also be recognised that the current pattern of land use within the river catchments has an impact on the river hydrology. Deforesting a catchment has the potential to increase flood flows, decrease dry season baseflows, and increase the sediment load within the rivers.

It must also be recognised that the current pattern of land use within the river catchments has an impact on the river hydrology. Deforesting a catchment has the potential to increase flood flows, decrease dry season baseflows, and increase the sediment load within the rivers. This situation complicates the process of managing the river water resources. The importance of good river water management is evident in view of the costs and conflicts associated with poor water resource management.

Current situation

All the river water resources are owned by DWR and potential abstractors must apply to the government for a license to abstract. Exceptions to this are those abstracting water manually for livestock and domestic purposes. The relevant District Water Board and the relevant Catchment Water Board consider abstraction applications. This process has been established to ensure that due consideration is given to downstream water demands. The members of the Boards are predominately government officers. Each abstraction application is supposed to be announced in a public gazette notice to enable the public to raise objections if required.

Once allocation decisions have been made, the district water

office is supposed to monitor water abstractions to ensure that abstractors comply with the limits of the permit, and ensure no illegal or unauthorised abstraction. Unfortunately this mechanism has not been operating effectively for a myriad of reasons, including:

- Water Boards meet infrequently.
- There is only nominal representation of water users on the Boards.
- No public notice of abstraction applications is given.
- There is no forum in which the decisions of the water boards are disseminated to the water users.
- Lack of financial resources to mobilise hydrologist and bailiffs to monitor resources and abstractions.
- Low morale within government officers to enforce water permit restrictions as this is considered "unpopular" and to deal with a situation which is considered overwhelming.

The result is that the majority of abstractors do not have valid permits. Furthermore, very few abstractors adhere to the conditions of the permit in terms of installing flow measuring devices (meter or measuring weir), installing sufficient storage, and abstracting within the allocation limits of the permit. The net result is essentially an open access situation in which the "tragedy of the commons" results.

The evidence for this is the fact that perennial rivers are becoming ephemeral, not due to climatic drought, nor due land use change in the catchment, but primarily due to over abstraction. The over abstraction is a symptom of poor resource management. The question then is how can the river water management be improved and does the community have a role in improving the river water management.

Community Participation in River Water Management

It is now widely recognised that a resource or asset is more likely to be managed sustainably if the stakeholders are involved in the management of that resource. So who are the stakeholders?

Various types of stakeholder and different categories under each type, can be identified as shown in Table 1. Each group may have a different relationship to the resource.

The river water abstractors have a vested interest in the

management of the river water resource, especially community water projects and commercial irrigators, who need a reliable water supply, and downstream communities who are at the mercy of the "tragedy of the commons" outcome. It is this vested interest that means that river water abstractors are more likely to contribute towards the goal of good river water management, even if these same water abstractors are the ones who are currently perpetrating the "tragedy of the commons". This is the same premise that has guided the formulation of the 1999 "National Policy on Water Resources Management and Development".

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The question then is what should be the role of the community and how should this participation be brought into the existing water management process.

Role of the river water users associations

A River Water Users Association (RWUA) is an association representing all the water abstractors of a particular river. Similar organisations are the Lake Naivasha Riparian Association or the Residents Associations springing up in Nairobi. The primary role of the RWUA is to represent the interests of the river water abstractors and to channel community participation in such a way as to compliment the Department of Water Resources in the management of the relevant river water resources.

It is important to recognise that DWR is ultimately responsible for the river water management (monitoring, allocating, etc.). The function of the RWUA is not to replace the DWR, but to compliment it at the community level. The RWUA can participate in the water management process by:

- Raising awareness in regard to water permit restrictions;
- Monitoring local adherence to permit limits;
- Providing a forum to disseminate government policy and decisions in regard to water abstraction; and
- Providing local manpower and transport to assist in water resource monitoring.

The case of the Ngare Nything/Sirgon river water users association

The Ngare Nything/Sirgon river rises from dispersed springs on the slopes of Mount Kenya within Kisima Farm, Meru District, and flows down to a confluence with the Ngare Ndare river near Il Ngwesi in Isiolo District. The reason for the dual name (Ngare Nything/Sirgon) is because the river is known as the Ngare Sirgon by the pastoral communities (the Ngare Nything is actually the adjacent catchment of a short river that rises in the Ngare Ndare forest and disappears below the lower forest boundary. The name aptly means "disappearing river"). The government has however named the Ngare Sirgon as the Ngare Nything. Hence both names are used.

The river is part of the wider Ewaso Ngiro North river basin. Various water abstractions from the river deliver water to numerous community water projects (for domestic and irrigation purposes), private large scale farms for domestic and commercial irrigation, Lewa Wildlife Conservancy (wildlife, livestock), individual small-scale farmers, and pastoral communities. The river serves an estimated population of 15,000 people, a similar number of cattle and livestock, and approximately 200 hectares of irrigation in large, small, and kitchen garden units. Historically the river was perennial. In more recent years, with increasing abstractions upstream, the river became ephemeral in the lower reaches, putting the pastoral communities and the agricultural communities into conflict for the scarce water.



MALAYSIA

Win-win solutions key to protecting environment



State of Commonwealth Environment



Win-win solutions key to protecting environment

By Shahidul Islam Chowdhury with Teoh Teik Hoong

The agonies and tragedies brought on by persistent water crisis were all that Malaysians met in the past year. It is almost ironic that lips run dry while other parts of Malaysia experience abundant rainfall, and the misfortune intensifies further when there is no tap water to be had even on a rainy day. The principal reasons for these tragedies are destroying the Wetlands by logging and clearing for agricultural use and other developments. Chemical contaminants are growing on. Pesticides, herbicides and fertilisers enter the rivers when they seep from agricultural areas. These have the potential to pollute rivers. Malaysia's land surface was once almost entirely covered with forest. Today, only about 50 percent remain under natural forest cover, the rest having given way to development of natural disturbances. Many people emerge as threat to coral reefs; they treat this entire living ecosystem of coral reefs as dead or coloured rocks. If these threats are not properly addressed in time and reversed then their impact on the bio-diversity and the environmentally significant floodplains will be grave.

Alarming water problems

Highland forests are important water catchment areas - natural "water towers" providing water for the domestic, agricultural, and industrial demands of the populated lowlands. More than 90 per cent of Malaysia's water supply originates from the rivers and streams.

Reservoirs and lakes flowing out from the highland forests act as natural water filters, these forests help ensure that the water is clean and free from silt and sediment.

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At higher altitudes, the highland trees are able to capture and condense moisture from the clouds, thus providing another source of water. Like sponge, the forest floor also, absorbs water - as part of the natural process in the water cycle- and slowly releases the water into our rivers and streams even during periods of low rainfall.

Highland forest decelerates the flow of rainwater down steep slopes, retaining some of it as well. This prevents torrents of muddy water from eroding the soil and causing landslides and flash floods. These important functions of the highland forests hang in delicate balance and are easily affected by the slightest shift in environmental conditions.

Current development trends in the highlands are threatening our natural "water tower-." Logging at high altitudes and land clearing on steep slopes not only adversely affect soil stability and destroy forest resources and bio-diversity - but also destroy a good, clean water supply!

Degradation, such as excessive clearing of forests, leads to the saturation of rivers and contamination of the very water we need. Water that once emerged from the highlands - pure and mountain fresh, flowing into sparkling, rivers full of life - is now being threatened by pollution. "Dead " rivers result, incapable of sustaining life.

Water shortages, landslides and flash floods are becoming common events in Malaysia. One of the main causes is that Malaysia's highland forests have become the target of unplanned and unsustainable development including such disastrous projects as inappropriate road building and excessive highland resort development. If urgent measures are not taken soon to protect our natural "water towers", good clean water may eventually have to be bought in bottles.

More questions than answers

Malaysians have been plagued with water problems at an alarmingly high rate in the last few years, despite abundant rainfall in the country. In spite of the need to address the root causes of water shortage, there appears to be a preference for

creating more dams.

The latest in this 'trend' is the raw water transfer project, which involves the building of two dams plus a tunnel, to transfer water from Pahang to Selangor. The project has reportedly been scaled down to only one dam, the Kelau Dam. After reviewing the Detailed EIA (Environmental Impact Assessment) report carried out on the project, WWF Malaysia has serious concerns over the environmental feasibility of the project. WWF Malaysia is concerned about the EIA's ability to guide the project, as well as the degree to which it provides an actual assessment of the potential impacts of the project.

The scientific basis and credibility of the EIA report is questionable. For example, it comments on the 'Hutan Simpan Bukit' in Bentong when it most likely was referring to the Bukit Tinggi Forest Reserve. An error like this raises questions on overall accuracy of on-the-ground information. In another example, it refers to a plant called Pandanus wangi, when no such plant has been described by scientists to date. This undermines our confidence in its scientific credibility.

The EIA report did not include an in-depth study on aquatic organisms, except fishes. Additionally, there was little study made on ground forest shrubs and epiphytes. In an EIA, it is important to have an understanding of the various functional groups of organisms (like seed dispensers and nutrient cyclers) so that potential impacts can be better understood and appropriate measures be taken to mitigate adverse impacts.

Baseline data of the existing environment were poorly described. Baseline data are important because they serve as a basis to compare the quality of the environment before, during and after construction. For instance, water quality will have to be monitored to check river siltation but without baseline data, it

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There can be no doubt that the dam construction is going to create damage to the forest ecology. The EIA report, through its general lists of species, enumerates approximately 57 species of animals that are either protected or totally protected under the Protection of Wildlife Act 1972.

would be impossible to ascertain the level of siltation after the project begins.

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There is no mention nor assessment made on the implications of habitat loss to these 57 species nor on how these impacts would relate to Malaysian obligations to regional or international

agreements or conventions. Among the 57 species are such threatened species as the tiger, tapir, siamang and clouded leopard.

Wetlands under threats

Logging: Many parts of the wetlands are being destroyed by logging and clearing for agricultural use and other developments, resulting in more severe and frequent floods downstream.

Land clearing and agricultural expansion: The ongoing loss of wetland habitats along the Kinabatangan river is potentially the most serious threat. Unlike logging, where usually only the large trees are taken, agricultural expansion, particularly for cash crops like oil palm, involves the irreversible removal of all natural vegetation, thereby displacing the wildlife species that depend on them for their survival.

Pollution of riverine areas: With the expansion of agriculture, another threat has emerged -- chemical contaminants. Pesticides, herbicides and fertilisers enter the rivers when they are leached from agricultural areas. These have the potential to pollute river water, which is then used by local inhabitants for their daily needs. They also affect fishing activities which many people depend on for subsistence and their livelihoods. With

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Pesticides, herbicides and fertilisers enter the rivers when they are leached from agricultural areas. These have the potential to pollute river water, which is then used by local inhabitants for their daily needs. They also affect fishing activities which many people depend on for subsistence and their livelihoods. If these threats are not properly addressed in time and reversed, their impact on the biodiversity and environmentally significant Kinabatangan floodplain will be serious.

Need to conserve rainforest

Malaysia's land surface was once almost entirely covered with forest. Today, only about 50 percent remain under natural forest cover, the rest having given way to development of natural disturbances.

The terrestrial forests in Malaysia are mostly dominated by trees from the Dipterocarpaceae family, hence, the term "dipterocarp forests". The dipterocarp forest occurs on dry land just above sea level to an altitude of about 900 metres. The term "dipterocarp" specifically refers to the fact that most of the largest trees in this forest belong to one plant family known as Dipterocarpaceae. It was so called because their fruits have seeds with two wings (di = two; ptero = wing; carp = seed).

This type of forest can be classified according to altitude into lowland dipterocarp forest (LDF), up to 300 meters above sea level, and hill dipterocarp forest (HDF) found in elevation of between 300 and 750 meters above sea level, and the upper dipterocarp forests, from 750 to 1,200 meters above sea level. However in Sarawak both the lowland and hill dipterocarp forests are known as mixed-dipterocarp forest (MDF).

HDF, which is normally found in areas 500 - 700 meters above sea level, contains

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At present, LDF is classified as a threatened habitat. There are very few areas of this forest type left outside of protected areas such as parks and wildlife reserves. While most of the country was covered with lowland forest in the past, today the majority has been cleared for other land uses, and the few remaining pockets are under threat.

less undergrowth. It is a little poorer in wildlife compared to the LDF, but is the preferred habitat of birds and small mammals that are tree "specialists" such as the squirrels. The *Rafflesia* sp., which has the largest flower in any plant in the world, is often found in these forests.

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There are some pockets of lowland forests near urban centres such as the Sungai Buloh Reserve, Kanching Forest Reserve (part of which is the popular Templer's Park) and Ampang Forest Reserve outside Kuala Lumpur. These areas, however, are under intense pressure from development and these islands of natural lowland forests are shrinking rapidly.

Beautiful and relatively undisturbed LDF can be found in Taman Negara in Peninsular Malaysia, Lambir Hills National Park in Sarawak and in the Maliau Basin, Sepilok Forest Reserve and Danum Valley in Sabah. But there is a real need to conserve the remaining areas of LDF that remain in other parts of the country.

Most of the dipterocarp forest left in Malaysia is HDF. This is because the terrain upon which HDF is found is usually hilly and rugged, making it unsuitable for agriculture or large-scale settlements, as well as being difficult to access and clear. Timber extraction from these areas is also more difficult, but improving technology may alter this situation.

Wild life in danger!

The *Rafflesia* can be found at altitudes of between 500 and 700

meters in the forested hill ranges of Sabah and Sarawak, as well as the Northern half of Peninsular Malaysia. This strange plant is named after Sir Stamford Raffles, the British adventurer who travelled the Southeast Asian region and founded Singapore in the early 19th century. It has the distinction of having the largest flower in the world. Some might even tell you that its flower has the foulest smell of any plant in the world, as it emits a faintly putrid door when in bloom.

The *Rafflesia* is a parasite. With no stem or leaves, it cannot synthesise or absorb from the ground any of the nutrients that it requires. Instead, it grows upon and feeds from the stems of a woody, wild vine known as *Tetrastigma*, a member of the grape family with leaves that have distinctive toothed edges, like a small saw.

The *Rafflesia* begins life as a small bud, which swells over several months until it reaches the size and shape of a compact cabbage. At this point, it in fact may look like a pale, orange cabbage. Then, for just a very few days, it bursts into a full flower. The bloom has been known to reach a diameter of one meter.

Aside from the disturbance of its habitat, one great threat is harvesting by humans. The plants is used in traditional Malay medicine and, despite its relatively rarity and unproven beneficial uses, you may actually find quite a number of *Rafflesia* blooms being sold in certain markets.

It is a Totally Protected Plant by law in Sarawak. Elsewhere in Malaysia, the plant is only safeguarded by laws when found in protected areas like National or State Parks. It is essential that nationwide laws are established soon if we do not want this unique species to become extinct.

Lowland forests

The lowland forest is one of the most complex, dense and species-rich forests. So on one hand it has great value for wildlife conservation and scientific research; on the other, it is the type of

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forest that's under great threat because of its value for commercial timber extraction. And therein lies the dilemma.

The term tropical lowland forest is used to describe forest where there is little or no seasonal water shortage and where the climate is continuously warm and humid (humidity can reach 100% at night). Within this environment there are more than 2,000 species of tree and plant forms, as well as a diverse range of animal and insect species. Some are endangered, some are endemic, while there are others that have yet to be discovered and studied.

The tree canopy of a lowland forest has three layers. The upper layer towers at between 30 to 40 m, with occasional giants of 60 m, while the second layer is between 23 to 30 m. The lower level is made up of saplings of a number of species. The ground vegetation is often sparse and comprises mainly small trees, and herbs.

Spend 24 hours trekking in a lowland forest and you'd see a fascinating diversity of animal and plant life and experience so many other sensations that will hopefully draw you further into the forest.

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The day typically begins with a misty dawn. As the mist slowly dissipates, the air will reverberate by the calls of various animals -- primates such as the Bornean gibbon and pig-tailed macaque, or bird songs of the straw-headed bulbul and hornbills. While you are assailed with these noises, and examine the various fungi, ferns, pitcher plants and wild orchids and watch out for the painted leech!

By mid-morning, it will be quieter as the animals settle down to feed, although birds will continue to fly past in flocks. This is the perfect opportunity for bird-watchers: tree-boring barbets that never seem to shut up their incessant drilling,

ground-dwelling pheasants trying to attract females in a rarely seen courtship dance. But don't be startled when sudden crashing sounds in the undergrowth announce the arrival of a bearded pig (so named for the bushy tufts of bristles on both sides of its snout).

With such a profusion of tree life in a lowland forest, you can certainly expect many fruit bearing trees. If you see a cluster of fig trees, you might catch a glimpse of the magnificent hornbills.

The dusk brings with it its own cacophony of sounds too as swarms of swallows and swifts swoop down low on the river for a last drink before retiring for the night. Bats such as the large Flying Fox (which has a wingspan of 1.5 m) will emerge from their roosts in tall trees and caves to feed on flower nectar and fruits, and in the process help pollinate many forest trees.

Klang Gates Ridge

The outskirts of the city of Kuala Lumpur is surrounded by many greyish outcrops that at first glance many be dismissed as mere limestone rocks. But one such length of craggy rocks near Ampang is not built of limestone, but of quartz.

Built almost entirely of quartz, which is essentially glass crystal, the Klang Gates Ridge has many reasons why it deserves to be declared a world heritage site and a national monument.

A quartz vein -- which is a naturally occurring thin thread of quartz running through granite or other materials -- is usually only about several millimetres to several centimetres wide. A quartz dyke, such as the Klang Gates Ridge, is its bigger cousin. Indeed, the most spectacular part of the Ridge is its mid-section, which stretches from Taman Melawati to the Zoo Negara in the Ampang area.

There are major quartz veins concentrated around Kuala Lumpur and Seremban because of the old Kuala Lumpur-Mersing fault zone. During the tectonic folding millions of years ago, massive buckling and faulting in the earth's crust thrust hydrothermal quartz upwards, where they then crystallise. In fact, there is another quartz ridge in Kuala

Another reason why a bigger area should be gazetted as a wildlife reserve is the presence of a rare animal, the serow. In the last survey carried out in 1985, the National Parks and Wildlife Department found the tracks of five serows, but it's anyone's guess how many exist today.

Lumpur along the Kajang-Cheras road, which runs about 8 km long. But the Klang Gates Ridge is unique simply because of its sheer size.

Another reason why it is unique is that it displays four types of quartz formation. However, much of it is opaque white or tainted with grey, and lined with minute needles of clear hexagonal quartz crystals in some places. Quartz is a hard mineral, but its crystals are not strongly bonded together, which is why it can crumble when exposed to the elements and to the effects of development.

Despite all its uniqueness, it gets very little conservation attention. Campers and hikers accidentally or intentionally destroy its flora and fauna or leave their trash behind while collectors chip off its quartz crystal as souvenirs. But the biggest threat is urban development.

Because of its proximity to Kuala Lumpur, and increasing demand for land to house the city's growing population, the foothills at the Ridge have always been under intense development pressure. Not only have clearings for agricultural settlements taken over much of its western slopes, but new residential and industrial areas are also earmarked. Much of this targeted area surrounds the National Zoo as well as the forests next to the Klang Gates Dam catchment area and the Ulu Gombak Forest Reserve.

The part of the Ridge surrounding the dam and forest reserve is rich with vegetation. In fact, surveys indicate that at least 265 plant species thrive here, with five of them endemic to the area. Hence, conservationists have reasons to fear for their future. Currently, only its inaccessibility is ensuring its survival.

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If development is allowed to go on unchecked, or if there is no active and proper management of the Ridge, including the reforestation of devastated slopes, the quartz dyke may, in time, disappear. Conservationists and scientists have persistently called for an enlargement of the wildlife reserve, or for the establishment of a state park.

Scientists and researchers say that the Ridge is valuable not only in terms of botanical or geological interest, but also in terms of what it can offer people. Because of its proximity to the city, it can be used for eco-tourism, education and recreation activities, but only if it is properly and sustainably managed to avoid further deterioration.

Mangrove forests

Mangrove forests are a unique ecosystem generally found along sheltered coasts where they grow abundantly in saline soil and brackish waters. An evergreen tropical plant, mangroves survive well in areas that are subject to periodic fresh- and salt-water inundation.

Mangrove trees have specific characteristics such as tough root systems, special bark and leaf structures and other unique adaptations to enable them to survive in their habitat's harsh conditions. The habitat is soft, silty and shallow, coupled with the endless ebb and flow of water providing very little support for most mangrove plants which have aerial or prop roots (known as pneumatophores, or respiratory roots) and buttressed trunks.

Despite its smelly reputation, a mangrove forest is a very dynamic and highly productive ecosystem. It not only plays multiple ecological functions essential to its surrounding habitats, but is also an important resource for coastal communities.

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Mangrove forests form only 2% of the country's total land area, but the environmental protection mangroves provide are critical to all. Mangroves;

- protect coastlines against erosive wave action and strong coastal winds, and serve as natural barriers against torrential storms. The plants also prevent saline water intrusion.
- retain, concentrate and recycle nutrients and remove toxicants through a natural filtering process.
- provide resources for coastal communities who depend on the plants for timber, fuel, food, medicinal herbs and other forest products.
- if managed properly, a mangrove forest can be harvested sustainably for wood and other products.
- are essential to sustain a viable fishing industry as it is an important breeding ground for many fishes, crabs, prawns and other marine animals.

A mature and extensive mangrove forest often has 'zones', where the types of plants found change as you move away from the sea. This has to do with the water and salinity level. Avicennia/Sonneratia zone Rhizophora zone Bruguiera zone Given the enormous benefits of mangrove forests, proper management and conservation is therefore necessary to ensure the continued existence of mangrove forests. Conservation of mangroves can be enhanced by:

- Devising well-balanced coastal land-use plans, such as maintaining sustainable limits in logging activities and other harvesting activities of its resources.
- Retaining protective mangrove buffers along coastlines and rivers to prevent erosion.
- Managing mangrove forests as fishery reserves to encourage environmentally -sensitive commercial aquaculture activities. Instituting public education and awareness programmes among the public to discourage indiscriminate clearing.

Creation of adequate legislative and institutional arrangements such as the National Forestry Act which recognises the value of mangroves and the need to manage mangroves sustainably. Introduction of social forestry schemes. Damaged forest areas can be planted and managed for small-scale village timber

enterprises. Mangrove species like *Rhizophora mucronata* or *R. mangle* are particularly ideal for mangrove plantations as they are both fast growing and lucrative.

Creation of nature reserves or national parks, for example the Matang Forest Reserve in Perak, the Kuala Selangor Nature Park in Selangor, and in Bako National Park in Sarawak, Likas Wetlands swamps and Sepilok Forest Reserve in Sabah.

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The Main Range

The Main Range, or known locally as Banjaran Titiwangsa, is the largest remaining continuous forest tract in Peninsular Malaysia. Running along the backbone of the peninsula, the Main Range stretches for 500km southwards from the border of Thailand. And it supplies most of the peninsula's water needs.

The slopes of the Main Range are also the most important water catchment areas for Peninsular Malaysia. Functioning as natural water reservoirs, the forests help ensure the continuous supply of clean water. Rivers that originate from the highland forests supply fresh water to meet almost 90% of the water needs of the domestic, agricultural and industrial sectors. Acting as natural water reservoirs, they help ensure that this water is clean and free from silt and sediment.

These forests are important water catchment areas. It is the source of many important rivers that supply fresh water to the states of Kelantan, Perak, Pahang, Selangor and Negeri Sembilan. And it is up to us to preserve the quality of our water sources for the sake of our own health and well-being. The tremendous economic value of clean water will quickly become evident if we need to pay the high costs of cleaning a polluted water supply.

Landslides can devastate roads, posing great danger to passing vehicles. The slopes of highland forests also act to prevent landslides. Highland forests slow down the flow of rainwater down slopes and help retain some of this water. Take

These forests are important water catchment areas. It is the source of many important rivers that supply fresh water to the states of Kelantan, Perak, Pahang, Selangor and Negeri Sembilan. And it is up to us to preserve the quality of our water sources for the sake of our own health and well-being.

away this natural "sponge" and you'll have torrents of muddy water eroding the soil, bringing with them landslides and flash floods. Rivers become choked with silt and water quality everywhere suffers.

The catastrophic consequences of landslides can cause devastation for people and the environment. Examples include the June 1995 landslide in a Genting Highlands slip road, which resulted in at least 21 deaths and 22 injuries, and the January 1996 landslide at Gua Tempurung. The most recent tragedy was the January 2000 Kampung Raja, Cameron Highlands landslide which resulted in six deaths. The Tanah

Rata-Brinchang road tragedy also cut off links for more than 15,000 people living on the Blue Valley Estate and Kampung Raja.

The highlands also have a rich array of biodiversity. The Mountain Peacock-Pheasant and the Malayan Whistling Thrush which are endemic to the Main Range are among the 600 or so species found in Peninsular Malaysia. The highlands are also home to over 25% of all plants species found in Malaysia. Of the 850 orchid species found in the peninsular, more than 400 are found in the highland forests within this Main Range. Studies have shown that there are still many undiscovered plants having medicinal value that provide potential cures for man's many dreaded diseases.

Various resident and migratory bird species are found on the Main Range. The hill station of Fraser's Hill is host to about 260 bird species, including spectacular birds like this Orange-bellied Leafbird. However, the Main Range is not as cool as it once was. Reports have already shown increasing temperatures in Cameron Highlands and Genting Highlands due to massive forest clearing. If this trend continues, the effects of a warmer climate would be severe and widespread.

Cloud formation would decrease, depleting the water supply for many cities throughout Malaysia. Many plant and animal species

could be threatened with extinction. The number of tourists could decrease, resulting in significant losses of national revenue. Finally, a temperature rise could devastate temperate agriculture such as tea, vegetables, fruits, cut flowers and ornamental plants.

Coral reefs

One of the most amazing and spectacular wonders of the marine world is the coral reef and its staggering variety of inhabitants. But now, after decades of over-exploitation and the effects of pollution, reefs are highly threatened and their loss can be very detrimental to us all.

Coral reefs occupy less than 1% of the marine environment, but they are home to more than 25% of all known fish species. But because the majority of coral reefs are located in regions known for extreme poverty and high population growth rates, they are particularly vulnerable to degradation.

Southeast Asia's reefs are the richest in terms of variety of species, but over 80% of them are threatened, primarily from coastal development, tourism and fishing-related activities. Yet there are very important reasons for their conservation, namely:

Cloud formation would decrease, depleting the water supply for many cities throughout Malaysia. Many plant and animal species could be threatened with extinction. The number of tourists could decrease, resulting in significant losses of national revenue. Finally, a temperature rise could devastate temperate agriculture such as tea, vegetables, fruits, cut flowers and ornamental plants.

Reefs maintain fisheries resources. Coral reefs are important breeding, feeding and nursery grounds for fish. In Malaysia, as much as 30% of fish caught depend on coral reefs. So when reefs are preserved, the fishing industry is safeguarded, and with it a great source of food for us as well as the livelihoods of fishermen.

Reefs attract tourists. As tourism can be a huge and lucrative industry, a healthy coral reef will attract scuba divers and snorkellers from around the world.

Reefs protect our shorelines. Coral reefs also protect our

Reefs save lives. Scientists and researchers are increasingly looking to the oceans in search of new drugs and other medical possibilities.

According to one estimate, half of all new cancer research now focuses on marine organisms. For instance, chemicals from sponges were used in a new drug to fight against herpes and certain cancers.

shorelines from the erosive power of storms and waves by acting as a natural barrier. Between 70% to 90% of a wave's energy is absorbed or deflected when it hits a reef.

Reefs save lives. Scientists and researchers are increasingly looking to the oceans in search of new drugs and other medical possibilities. According to one estimate, half of all new cancer research now focuses on marine organisms. For instance, chemicals from sponges were used in a new drug to fight against herpes and certain cancers.

Reefs preserve biodiversity. Coral reefs are the most diverse of all marine ecosystems. If this is destroyed, so too would the many potential sources for new medicines and food.

Reefs are not dead or coloured rocks. They are an entire living ecosystem in itself. Some 3,000 species of reef life have been recorded inhabiting a single reef. A coral reef is actually a live colony formed from huge numbers of small animals called coral polyps. These polyps live inside limestone cups, and feed on plankton via its tentacles.

When a polyp dies, the limestone cup that housed it remains until the next polyp comes to live in it. This material builds up, with the living corals growing on top of the skeletons of past generations. They grow very slowly, so a careless kick from a snorkeller or diver can destroy decades of growth.

Coral reefs are also subject to other serious threats, including:

- Pollution from sewage that is pumped into the sea, or from chemicals (for example, fertiliser, industrial waste, oil and dislodge from ships) that seep into the sea.
- The development on land that causes silt (from activities such as dredging, deforestation, etc) to wash into the sea. This silt not only reduces the amount of light that passes through the water to the reefs but also settles on them, thus smothering them and stopping new coral from growing.

Destructive fishing methods such as blasting (by exploding a bomb in the water) and the use of sodium cyanide (which stuns the fish and enables them to be easily collected, primarily for restaurants and aquariums) not only destroy reefs but their inhabitants as well.

Unmanaged tourism activities, while bringing much needed revenue, can have a negative impact. An increase in tourists can lead to an increase in coastal development, which in turn leads to increased siltation and sewage pollution.

The realisation that coral reefs are vulnerable has led to the establishment of several protected marine areas. In Peninsular Malaysia, the seas around forty islands have been grouped into five different administrative centres managed by the Department of Fisheries Malaysia, while three more in Sabah are managed by Sabah Parks.

Within these marine parks, any activity that destroys or damages coral reefs and their ecosystems is illegal, and these include fishing, collecting and removing of corals and shells, causing pollution, dropping anchors on reefs and the construction of any structure on them.

A blanket of trees for industrial zones

The Government, in a joint project with a non-governmental organisation, is trying to change the landscape of Malaysia's industrial ghettos by planting a total of one million trees over a three-year period. The pilot project was mooted by the Tree Planting Group-Malaysian Nature Society with the support of the National Landscape Department and the Department of Environment. Deputy Housing Minister Datuk Peter Chin said that under the "Industrial Vision - Creating the Park Environment" project, the plan was to plant 1,000 trees a day on both private and state land over three years to achieve the one million trees target.

The 'natural' driving force of the future

Malaysia is giving advantages to natural gas vehicles (NGV) of using natural gas compared to petrol or diesel. This is a welcome move. Among the incentives being suggested is a lower road tax rate for motorists using natural gas. If the

Government can thus offer to help lower the cost of maintaining a vehicle, this would be a tangible benefit certain to attract more NGV converts as consumers.

There are already some 5,000 NGVs in the Klang Valley alone, with more than 1,500 of them taxis. Dual-use (petrol and gas) taxis now enjoy a 25% cut in road tax, while those using gas alone are entitled to a 50% cut.

Proton is reportedly scheduled to produce 3,000 units of the Iswara equipped with gas cylinders next year, and 50,000 units the following year. By 2007, about 200 stations supplying gas would be operating around the country.

Motorists with NGVs already know that the benefits include lower fuel costs and more environment-friendly motoring. NGVs are growing in popularity in several countries around the world, with the advantages of being lighter on the pocket and kinder on the natural environment. In Malaysia, vehicle emissions produce 90% of air pollution, so switching to NGVs makes excellent sense.

Source : World Wide Fund for Nature in Malaysia



MALDIVES

Turtles at stake in Maldives



State of Commonwealth Environment



Turtles at stake in Maldives

Blue peace

The Maldives has exceptionally rich and productive marine environment and nurtures no less than five different species of marine turtles, each of which uses a different part of the marine environment. Marine turtles are one of the most ancient and interesting animals to be found within the depth of the Maldives. They use a unique compass, relaying on Earth's magnetic field and wave motion to find their way as they roam the seas: after many years and long journeys in the ocean they often return to the nest on the beach where they were born. After 90-million years living in the oceans of the world, turtles are now on the decline. This is the result of man's activities.

Turtle species in the Maldives

Four species of turtles are known to nest in the Maldives and the fifth one is an occasional visitor to the Maldives seas. These species are:

1. Green Turtle (*Chelonia mydas*) / VELAA
2. Oliver Rudkey Turtle (*Lepidochelys olivacea*) / VAAVOSHI VELAA
3. Hawksbill Turtle (*Eretmochelys imbricata*) / KAHANBU
4. Loggerhead Turtle (*Caretta care*) / BOABODU VELAA
5. Leatherback Turtle (*Dermochelys coriacea*) / MUSINBI (not known to nest)

Each species has its own habitat and feeding needs. The Green turtle is primarily a vegetarian feeding on sea grass and algae. Hawksbill turtles live on coral reefs and use their long beaks to probe into spaces between corals to find sponges and invertebrates to eat, the Leatherback feeds in the upper layers of the open sea, jellyfishes are vital part of its diet. Little is known of feeding grounds of Loggerhead turtles which are mainly invertebrate and mollusk feeders, or of Oliver Ridley turtles which feed on crustaceans.

As a basis for designing conservation strategy for the turtles in this part of the world, local population, and their lives need to be studied in more detail. Recommended survey techniques include a tagging programme and local information network to collect and co-ordinate information available from fishermen, diving instructors and individual conservationists.

Marine turtle stocks are also declining throughout the Indian Ocean region. Persistent over-exploitation, especially of adult females on the nesting beach and the widespread collection of eggs are largely responsible for the depleted status of six Indian Ocean species. In addition to direct harvest, marine turtles are accidentally captured in active or abandoned fishing gears, resulting in death to tens of thousands of turtles annually. Coral reef and sea grass degradation, oil spills, chemical waste, persistent plastic and other marine debris, high density beach-front development, and an increase in ocean-based tourism have damaged or eliminated nesting beaches and feeding grounds. Population declines are not always entirely blamed on indigenous interference, but another cited reason is

because marine turtles are among the most migratory of all Indian Ocean fauna. What appears, as a decline in local population may be a direct consequence of activities of people many hundreds of kilometres away. This important aspect of their lifestyle should be called for at the regional level of conservation along with crucial local conservation.

Recommendations

If no appropriate actions are taken to strengthen the existing conservation measures and simultaneously introduce new measures to reduce the threats to the survival of marine turtles, these interesting animals will sooner or later be on the verge of extinction.

As a basis for designing conservation strategy for the turtles in this part of the world, local population, and their lives need to be studied in more detail. Recommended survey techniques include a tagging programme and local information network to collect and co-ordinate information available from fishermen, diving instructors and individual conservationists.

The creation of sanctuaries

There is urgent need to protect the already identified nesting beaches from human encroachment, which is the most critical turtle problem in the Maldives. It is also recommended their feeding grounds and other important habitats are identified for effective conservation and management. The first step is for the government to declare protect islands (uninhabited) to facilitate the creation of sanctuaries or areas in which human activities would be prohibited or minimised. However, most of identified nesting beaches are in uninhabited islands and would be difficult to stop poaching of turtles and eggs, unless the government includes a new clause to the existing agreement on leasing of uninhabited islands, prohibiting the removal of turtle eggs from the nests. The government should also encourage the protection of nesting beaches. However, this would not solve the problem of poaching of eggs completely from the protected islands without strict enforcement. Nation wide ban is the most ideal measure presently, however, it is believed this would upset the public, since turtle eggs are used to make one of the Maldivian favourite dish, (velaa folhi). The indigenous Maldivians should be allowed to exploit some of the eggs, after all, the aim of conservation of turtles is to perpetuate turtle population for sustainable exploitation in the future.

However, most of identified nesting beaches are in uninhabited islands and would be difficult to stop poaching of turtles and eggs, unless the government includes a new clause to the existing agreement on leasing of uninhabited islands, prohibiting the removal of turtle eggs from the nests.

Sign CITES

The Maldivians has not acceded the CITES convention (the Convention on International Trade of Endangered Species of Wild Fauna and Flora). All five species of marine turtles seen in the Maldivian waters are on Appendix I (the most endangered species) of the CITES convention. The Maldives signed the bio-diversity treaty at the Rio Summit in June 1992 and it has been ratified later on. By ratifying the bio-diversity treaty at the Rio summit in June 1992 and it has been ratified later on. By ratifying the bio-diversity treaty the Maldivians commit to maintaining bio-diversity and the conservation of endangered species including marine turtles. The Government of the

Therefore the Government should impose regulations, on tourist resorts where turtle come to nest, requiring that beachfront lights be shielded, lowered, recessed, and/ or re-directed so that emitted light is not visible from the nesting beach.

Republic of Maldives should accede the CITES Convention and the Bonn Convention on migratory species. The number of parties to CITES are now 132. The accession of the following countries came into force as of the date shown: Mongolia (4 April 1996), Saudi Arabia (10 June 1996).

Regional marine-turtle conservation programme

In order to conserve marine-turtles, we therefore must know how big the marine-turtle populations are. Today we know regrettably little about this

scientifically. However, empirical evidence shows that there are declines in number of turtles nesting in the Maldives. Population decline are not always entirely indigenous, what appear as decline in local population may be direct consequence of activities of people many thousand kilometres away, they are regional resource, and the survival depends on the co-operation of the coastal states of the South Asia. The information needed by governments and non-governmental organisation (NGOs) to eliminate causal factor in marine turtle population decline and exercises trans-boundary stewardship over these migratory species, it is recommended to develop a regional marine turtle conservation programme within the framework of existing regional organisation.

Tourism

With growing number of tourists visiting the Maldives, number of uninhabited islands are developed into resorts, and more and more beaches and nesting sites are getting destroyed and lights from the beaches are causing problems to the hatching. This can lead the hatching to wander inland towards the houses and lamp posts instead of the moonlit sea. There predators will eat them, or they will die of dehydration in the sun the following day. Therefore the Government should impose regulations, on tourist resorts where turtle come to nest, requiring that beachfront lights be shielded, lowered, recessed, and/ or re-directed so that emitted light is not visible from the nesting beach. Low pressure sodium (LPS) vapour lights emit

wavelengths least attractive to marine turtles and their use must be encouraged. And also discourage not to leave lounge chairs, sail boats, and other obstructions on nesting beaches at night.

Beach development

It is becoming more difficult for turtles to find suitable nesting beaches. A turtle must make her nest well above the high tide, or the eggs will be spoiled by sea water or the whole nest washed away. If any turtle nest is well below the high tide mark, it is advised to remove the eggs as soon as it finish laying eggs, and carefully bury them well above the high tides. Coastal developments and structures to protect properties from the beach erosion reduce the width of the beach and some cases leave no beach at all. These make it difficult for projects that must be carried out for Environmental Impact Assessment (EIA) and specifically look into bio-diversity, such issues must be looked into prior to giving permission to start a development project.

Conclusion

Recently, the Government of the Maldives has imposed a total ban on the catching of turtles in the Maldives as well as the sale, import and export of all turtle products. However, the turtle egg exploitation continues. Without protection of eggs and nesting beaches, it is believed that turtle population cannot be perpetuated for the enjoyment of future generations.

Coastal processes around a Maldivian island

By Thomas Le Berre

The coastal processes are of course dependent on the local configuration, but the main forcing can be identified: oceanic swell, wind waves from the South-West monsoon and wind waves from the North-East monsoon.

The oceanic swell is mostly from the South-East, even though on the western side of the archipelago it is rather from the west. In this respect, it is highly influenced by the configuration of the atolls and the bigger channels that separates them. On the island inside the atoll it can still have an importance if there is a discontinuity in the atoll ring, which allows the main swell to be diffracted inside the atoll. It is usually the most important factor as the periods are the longest and they carry more energy and their influence reaches deeper places. In fact, most of the energy from those waves is dissipated when they crash on the

The oceanic swell probably has a big influence on the creation of islands as in many atolls in the Maldives, the side that is most exposed to the oceanic swell has got the most numerous and the longest islands.

reef crest. In many places, they are the main forcing of the current on the reef flat and around the island, thus determining most of the sediment transport. To prove it, the sediment found on the island is usually comprised of big chunks of coral rubble taken of the reef on the side exposed to the oceanic swell, which are getting transported along the coast and getting eroded and therefore their size is getting reduced as we move along the beach.

Eventually when we reach the protected side, we find a nice sandy beach. The oceanic swell probably has a big influence on the creation of islands as in many atolls in the Maldives, the side that is most exposed to the oceanic swell has got the most numerous and the longest islands.

The wind waves created by the South-West monsoon is the second most important factor as the wind from the south west are usually more important than the one during the North-East monsoon. They don't carry the same energy as the oceanic swell, having shorter periods. Still the atolls are generally large enough to enable those wind waves to be generated inside the

atoll. When they reached the western and northern sides of the atoll, they are usually consequent on windy days, and the reefs on the inside of the atoll are generally a bit lower, these waves comes all the way to the coast and have a major role in the sediment resuspension and transport.

The wind waves created by the wind from the North-West monsoon are the least energetic factor, even though they are locally important. They often contribute in increasing the effects of the swell during the North-West monsoon. As we can see, the coastal processes are highly dynamic. They can be considered as a system where the oceanic swell is the principal factor and where the alternation of the monsoon causes the wind induced waves to either counter the effects of the swell or increase them. It is therefore not surprising that a sand bank is often shifting from one side of an island to the other according to the monsoon.



MAURITIUS

A new agenda in the media



State of Commonwealth Environment



A new agenda in the media

By Soodhakur Ramallah

Environment Journalism, as in most Third World counties, is fairly a new topic in Mauritius. With a birth rate of around 2.5% and unemployment at 50% in the early 60s, the main priorities of successive governments had been to feed the population and the creation of jobs. Environmental protection ranked only as the third major concern for the government and the population after education and health. Though people were well aware of their responsibilities towards the protection of their environment, however, most of them did not play an active role in its improvement. At the same time the population did not know which authority to contact in case of particular environmental problems except in the case of excessive noise or construction without a valid permit.

In order to alleviate the poverty of the population, Mauritius created a free export-processing zone at the beginning of the 70s, which dealt mainly in the manufacture of garments. With the help of foreign advertising agencies, the island portrayed itself as a paradise for foreign investors due to its geographical location in the Indian Ocean-mid way between Africa and Asia.

Another factor that played in favour of this country is that Mauritius is one of the oldest democracies in Africa where free and fair elections are held every five years. Consequently, foreign investors felt secure that any government in power would not expropriate their property.

Our efforts proved to be very successful, taking into consideration that Mauritius is the second largest world producer of woollen clothing in the world, though we do not rear a single sheep on the island.

The Export Processing Zone (EPZ) generated so much employment that this

In order to alleviate the poverty of the population, Mauritius created a free export-processing zone at the beginning of the 70s, which dealt mainly in the manufacture of garments.

Environmental protection was relegated to one of the last items on the list of priorities. Even journalists had a vague idea about what environmental journalism stood for.

But the last few years have seen a change in mentality. Mauritians, especially journalists, are very much concerned that this pace of development if not planned properly will be a bane to our ecological balance.

country was compelled to import labour from mainland China. More than 5000 Chinese women now work in our EPZ. Another sector of the economy that has attracted foreign investors has been the tourism industry. Barely 5000 tourists visited the island in the 60s. Last year, Mauritius welcomed more than 570,000 tourists mainly from Europe and it is projected to absorb around 750,000 by year 2002. Mauritius was voted "Best Island " for tourists in the African and Middle East region for 1999.

The economic development has been so rapid unemployment has been eradicated and the standard of living has increased dramatically that Mauritius is now considered a "threshold country". Environmental protection was relegated to one of the last items on the list of priorities. Even journalists had a vague idea about what environmental journalism stood for.

But the last few years have seen a change in mentality. Mauritians, especially journalists, are very much concerned that this pace of development if not planned properly will be a bane to our ecological balance.

More textile factories mean a greater need in electrical power and consequently more power stations and more gas emissions. According to a study by the meteorological department, 95% of gas emissions are emitted from the production of electrical power, coming mainly from fossil sources - mostly benzene, diesel, heavy oil, petrol and liquefied gas. These emissions represent 99.9% of the total emissions of carbon dioxide and 94% of all gas emissions. Sulphur emissions also come massively from the production of electricity - 65%, industrial activity - 22%, and from the transport industry - 12%. More than 250,000 motor vehicles were registered here last year for a population of 1.1 million - 125,000 two wheelers and the rest cars, buses lorries and tractors etc. Up to now, lead free petrol is not available on the Mauritian market due to the fact that the

engines of most vehicles are not adapted to this type of petrol. Secondly, motor vehicles are not adapted with catalytic converters.

It has been suggested that vehicles according to the registration numbers should be allowed only after a certain time in town as it is done in Singapore. Less polluting vehicles should be given a "green sticker" which will allow them certain priorities which could be defined at a later stage.

Up to now, lead free petrol is not available on the Mauritian market due to the fact that the engines of most vehicles are not adapted to this type of petrol. Secondly, motor vehicles are not adapted with catalytic converters.

Officials and journalists studying the problem of gas emissions in this country have warned that if appropriate corrective measures are not taken now, much damage will be done to the coastal regions and to our agricultural basis. The rise in the sea level will provoke the erosion of our beaches, damage to our coastal infrastructure, the degradation of our coastal barrier and mostly the loss of wet land and low level lands on the littoral. It is estimated that the rise in the sea level according to regions would be in the margin of 15 to 95cms by year 2050. More than 1050 hectares of land on the coastline could be affected, amounting to 0.5 of the total land surface of the island. The most threatened regions would be the South West, the North and a bird sanctuary where migrating birds come far as Siberia.

Another great danger which could affect our tourist industry would be beach erosion which would be caused by the number of dykes on the beaches, most of which have been constructed illegally. Coastal roads would also be threatened by the rise of the sea level. It is foreseen that more than 1000 houses would be completely inundated. If we consider an average of 4.7 persons per housing unit, 6000 persons would be affected.

The climatic change will certainly play havoc with our coral reef barrier. The rise in temperature of seawater will provoke the death of corals and their bleaching. El Nino has had this effect in the Seychelles Islands not far from Mauritius. At the same time oxygen content of the water will diminish and the growth of algae would be slowed. This process will inhibit the growth of fish and diminish the chances of the survival of larvae and eggs.

A series of measures have been recognised to reduce gas emissions into the atmosphere:

- Reduce the use of benzene and diesel and encourage the use of liquefied gas.
- The moderate use of motor vehicles and better control of traffic
- The intensive use of solar water heaters
- The introduction of up to, date and energy saving devices in households and offices
- Increase the awareness of the public in energy saving industry and business
- The banning of sugar cane field burning prior to harvesting
- Reduction in the use of artificial fertilisers

At the individual level, the best way to counter the green house effect would be to plant trees. Five trees planted by each Mauritian would be sufficient. These trees consume a lot of CO₂ during the process of photosynthesis and give away oxygen. These would be forests would act as reservoirs producing oxygen and traps for CO₂. Unfortunately in Mauritius since the last 50 years, due to a great demand for land for human and industrial purposes and a rapid increase in the population in the late 40s and 50s, forests have rapidly disappeared with only 1 percent of the original indigenous forests remaining.

Foreigners coming to Mauritius are very surprised to find that they can barely buy fresh fish on the market - a result of the unwise exploitation of our marine resources. Before fishermen could be able to catch 50 to 70kg of fish per boat, but the intense use of dynamite has so badly damaged our reefs and marine resources that they would be lucky today if they catch 5 to 7 kg daily.

Another great danger which could affect our tourist industry would be beach erosion which would be caused by the number of dykes on the beaches, most of which have been constructed illegally.

One of the measures recognised has been the banning of coral mining, which has been going on for the last 200 years. Coral reefs play an essential role in buffering the erosive forces of waves. The principal source of lime for the construction industry, the mining of corals became a very lucrative business in the 80s when a construction boom

started on the island.

Environmental journalists watching the pace at which the tourism industry has expanded in Mauritius have voiced much concern. Tourism is now one of the main sources of foreign income to this country. It occupies the 3rd place after the Export Processing Zone and the sugar industry. As I have already noted, Mauritius is expected to welcome more than 750,000 tourists by year 2002. 1Jp to recent times, Mauritians have been immune to the influx of tourists, but recent surveys and polls have shown that there is a sense of negative attitude that is taking hold of the population.

The beauty of our lagoons and the diversity of religions and cultures have made of this country a "dream island" for tourists coming mainly from Europe. Tourists come here not only to enjoy the beaches but also to discover its culture and people.

The main cause for concern among the population has been the feeling of being invaded by a too big influx of tourists and by the big hotels, which are encroaching on public beaches. The population has the feeling that sooner or later no public beaches would be left for Mauritians. One of the measures would be to limit the number of hotels to no more than 15 to 20 on the littoral. Secondly, the hotels would be responsible for the safeguarding of their portion of beaches and protect it from erosion.

Another cause for concern has been the number of beach facilities built to attract tourists, the most recent one being the project of setting up a marine park on the South coast. It is argued that the park will protect the environment of the coastline and at the same time generate jobs in the region.

Supposedly its primary objective would be to protect the coral barrier, but would also be a site, where people would be able to get acquainted with the diverse variety of marine life, along the coast. Fishing would be allowed but in certain zones only. The public beach on the site would be accessible to one and all while

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the activities of pleasure crafts would be controlled and regulated by a series of diverse rules.

Directly and indirectly, the marine park, if marine properly would be a source of development for the region in way of employment for watchmen, cleaners and guides for visitors. The promoters argue that it will be a major eco-tourist attraction which is gaining favour all round the world and will increase the number of tourist visiting the region. They further claim that the fish population increases dramatically in the surrounding waters as it has been noted elsewhere in the world but most particularly in the Philippines.

But what is worrying environmentalists is how is the park going to be managed. Though many guarantees have been given to this effect, there is a fear that in the long run control will be very slack.

In a bid to attract rich tourists, especially from Japan, a series of golf courses have been built on the island. Unfortunately, the Environmental Impact Assessment (EIA) of such structures has not been fully studied. A recent project to build a golf course on the Deer Island on the east coast has brought to light the conflicting interests of the hotel industry and the fishermen of the region.

Even before the ETA Committee had pronounced itself and given the green light, a politician had already announced that the hotel will be permitted to go on with the project. So much for political interference. But what has irked mostly the local population is that very little information has leaked from the project.

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Those journalists who have followed the situation closely have found out that the project consists of building an 18-hole golf course covering 7000yds where international competition could be held. The project also includes the construction of a clubhouse, a restaurant and an uncovered seating area. Since there is no source of water on the island, a pipeline has to be built to bring water from the mainland.

The creation of the course on an area of 47ha will necessitate the deforestation of about 20ha of forest (which is a big area considering that there are almost no forests left in Mauritius), the displacement of about 80,000m² of rocks and sand, the planting of special grass and the building of an irrigation pond.

The deforestation of the island has been the most sensitive question since it is home to many rare indigenous species. A well known German ecologist and journalist for in ecological periodical in Munich working for Mauritian Wildlife who has studied the project has warned of the negative impact on marine life.

The deforestation of the island has been the most sensitive question since it is home to many rare indigenous species. A well known German ecologist and journalist for in ecological periodical in Munich working for Mauritian Wildlife who has studied the project has warned of the negative impact on marine life.

According to him during the season of heavy rains and during irrigation water running into the lagoon will carry a lot of chemical fertilisers which will cause immense damage to the fish colony and to the coral barrier. As it is fishermen's catches have been diminishing from year to year and they are apprehensive that all the chemical compounds that will flow into the sea will make fishing completely impossible.

The public, on the other hand, is more concerned that as the golf course will cover almost 90% of the island, little space will be left on the beaches for their weekend outings.

One source of marine pollution, which has for a long time been neglected to be dealt with, is the amount of debris and plastic containers floating along the coastline. Plastic are in great demand as they are durable, relatively inexpensive and lightweight. However these properties can create problems when they are not managed properly.

Plastic does not break down readily and therefore tends to remain in the marine environment for three to five years if not longer. Marine life is especially sensitive to the debris. Wildfowl and sea creatures get hurt or killed when they mistakenly eat or become entangled in them. Many cargo vessels in use today were not designed with adequate capacity to store garbage and

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often tourists and recreational boaters do not bring their trash ashore but just dump it into the sea.

We had at one time organised youth outings on the coastline to collect plastic bags, bottles and bits of wood from the sea, but it was of little success. We have recommended the setting up of facilities and dustbins along the outline for the use of campers and weekend outing goers.

It is usually said that the youth is the future of a country and what better occasion that Environment Day to bring to them the need to protect our environment. Organised by

environmental journalists, a rally attended by college goers has been held for many years. Especially much stress has been laid on the need to keep the island cleaner. Year's back, all soft drinks were contained in glass bottles which could be returned to the shops after use. Having joined "the civilised world" most of our beverages are peaked in plastic bottles which has turned the island into a big garbage site. "Go for Green" has been the battle cry of the year's rally. Teachers have been advised to set up teaching modules where youngsters would be initiated to the basics of environmental protection.

As mentioned before, Mauritius decided in the late 60s to set up an Export Processing Zone (EPZ) producing mainly textile products. The zone, which was at the beginning mostly concentrated on the outskirts of the capital, has been expanded and special zones are now to be found all around the island. These factories have in their stride brought with them a series of environmental problems mainly refuse generated by them.

An alarming situation has been created due to a lack of dumping grounds. These who were created were located far from villages and towns. With the increase of population and a great demand for land for housing purposes, many of them are now almost near villages. The practice in this country has always been the burning of refuse, which has become an important polluting and health issue.

For some years environmental journalists have decried this practice, but unfortunately it is still in use and the amount of smoke emitted daily is so consequential that it can be observed by sight from far away. Studies have also shown the unsanitary impact of these dumping sites. Industries have been asked to utilise their raw material more judiciously and where possible to recycle them.

Unfortunately, the owners of many textile factories coming from the Far East still lack environmental awareness and access to information and expertise. Some also do not care. Their primary aim is to make money as fast as possible. The laws regulating the EPZ are such that they have no incentive to protect our environment. Investors opening a factory in the EPZ do not pay customs duty on their machinery and raw materials and are also exempt from income tax for the first five years of operation. Foreign factory owners can under certain circumstances claim Mauritian nationality. This has led to a lot of abuse.

Some owners though warned by the competent authorities that their factory is polluting just pretend that they are taking steps to remedy the situation. By the time new checks are made, the proprietors have already closed the factory and gone a broad. Also though there are legal structures which might force firms to pollute less, the supervisory system seems to be lacking behind. Many of these firms just dump their solid and liquid waste in nearby rivers.

What have been the problems faced by environmental journalists in this country? One of the main complaints has been the lack of information available to them. Journalists have to use all types of tricks to pry information from officials. On the other hand, workers are afraid to talk if there is something going on wrong in their factory, for fear of losing their job or being victimised. It may sound funny, but one of the constraints that journalists face is to persuade the editor to publish their article. The reason is obvious. Newspapers depend largely on adverts and too much criticism may dry out this source of revenue.

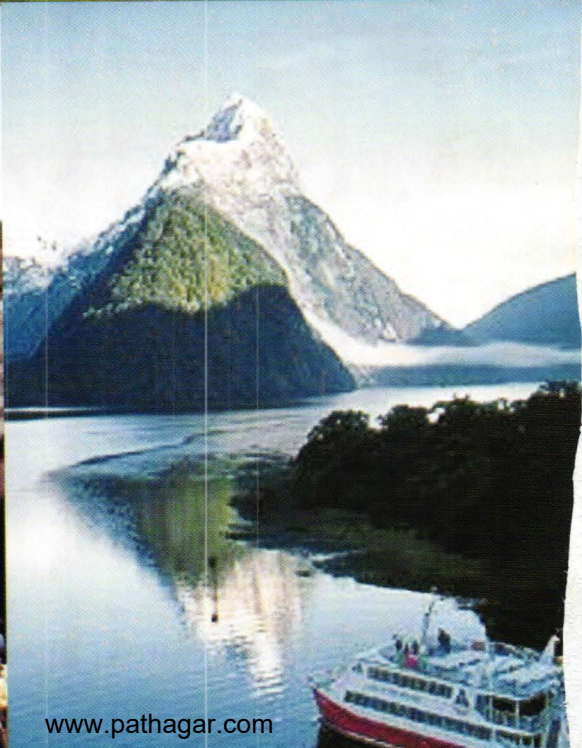


NEW ZEALAND

Environmental agenda on the top



State of Commonwealth Environment



Environmental Agenda on the top

New Zealand is a cluster of islands in the South Pacific. Its three largest islands, the North Island, the South Island, and Stewart Island, are much bigger than most that dot the Pacific page of the atlas, and they lie mostly on a north-east by south-west axis. Together, they are more than 1,600 kilometres (km) long but only 450 km across at their widest point. Their combined area is 270,500 square kilometres or 27 million hectares (ha), about the same size as the British Isles or Japan.

First named Nieuw Zeeland by a Dutch map-maker some decades after Abel Tasman's 1642 voyage of discovery, the islands did not acquire their collective Maori name, Aotearoa (Land of the Long White Cloud), until this century- though the word was sometimes used earlier to refer to the North Island (Barlow, 1994).

However you look at it, New Zealand is remote. Since parting from the ancient supercontinent of Gondwana 80 million years ago, it charted an independent course which steered away from other landmasses and well out into the Pacific. Its nearest continental neighbours are Australia to the west, Antarctica to the south and South America away over to the east.

New Zealand is often called 'the Shaky Isles'. Beneath its hilly surface are two colliding tectonic plates, the Pacific and Indo-Australian plates. Their first meeting about 135 million years ago is what thrust the New Zealand landmass out of the ocean on the east coast of

New Zealand is often called 'the Shaky Isles'. Beneath its hilly surface are two colliding tectonic plates, the Pacific and Indo-Australian plates. Their first meeting about 135 million years ago is what thrust the New Zealand landmass out of the ocean on the east coast of Gondwana. The plates continue to push and slide against each other, periodically jolting different parts of the country and sending shudders through land and people.

The climate of New Zealand reflects both its location and its geography: maritime, temperate, and breezy (some would say windy). The moist breezes blow mainly from the west, swirl up over the mountains, and generate heavy clouds which spill their rain as they rise. As a result, the west coast, particularly of the South Island, is wet and lush; the east coast is drier.

Gondwana. The plates continue to push and slide against each other, periodically jolting different parts of the country and sending shudders through land and people. The mountainous surface is cracked and fractured by rows of fault lines and is pock-marked in the North Island by several active volcanoes.

In the South Island the colliding plates have forced up a high, snow-capped range of mountains, the Southern Alps, which are rising at a rate of about 1 centimetre a year, just enough to compensate for the constant wear and tear of erosion in this high rainfall environment.

The Southern Alps include 18 peaks which tower above 3,000 metres, the highest being Mt Cook at 3,754 metres.

The snow and ice from these mountains are carried away by 360 glaciers. The longest, Tasman Glacier, grinds its way for 29 km past the eastern slopes of Mt Cook down towards Lake Pukaki. Shorter, but more accessible glaciers, such as the Fox and Franz Josef, flow to the west and are well-known tourist attractions. Ultimately, the Southern Alps are drained by a series short, swift-flowing rivers on the west coast, and several wide shingle-bedded rivers on the east.

The largest of these is the 322 km Clutha, which carries more water than any other river, but is not quite the longest in the land. That honour goes to the North Island's Waikato (425 km) which flows from the vast volcanic crater that holds the country's largest lake, Taupo. The period of human settlement is now believed to be significantly shorter than the thousand years commonly quoted in popular accounts (see Box 1.3). Recent analysis of radiocarbon dates from archaeological sites suggests that humans have been here for no more than 750 years, give or take a century (i.e. arriving somewhere between A.D. 1150 and A.D. 1350). The first arrivals were Polynesian-speaking settlers who made New Zealand one of the remotest outposts of the 'Polynesian Triangle'. When it was incorporated

into the British Empire nearly 160 years ago, New Zealand also became the remotest member of that realm and is still the Commonwealth country furthest from Britain.

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The winters are cool to cold, the summers are warm to hot. In recent years, as the power of the Southern Oscillation (the Pacific Ocean's see-sawing high and low air pressure systems) and the associated El Niño and La Niña weather patterns have become better understood, they have provided explanations for unusually cool summers-or equally unusual warm ones-and the droughts which sometimes parch the east coast of both main islands. The climate is ideal for agriculture, and to the casual visitor, the country is a land of lush green farms and neatly fenced paddocks full of cows and sheep. Pine forests, big and small, are another, more recent feature. The number of farms and livestock tends to disguise the fact that less than one-quarter of New Zealand is less than 200 metres above sea level. Steep hills or mountain ranges, sometimes brown, bare, and badly eroded, sometimes green and clad in lush native forest, often form a backdrop to the scene.

Almost without exception, the animals and birds seen from the road on a drive through New Zealand, have been introduced and have some link to farming. The indigenous species are more shy. New Zealand parted company with the prehistoric supercontinent, Gondwana, 80 million years ago. This

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During the lengthy consultation and planning process, over fishing and overcapitalization intensified. By 1984, the inshore harvesting sector was over capitalized by an estimated NZ\$28 million and correction would mean the retirement of 44 per cent of the existing fishing capacity.

has produced species of plants, animals, and birds that are found nowhere else in the world, and that need either their ancient shadowy forest habitat or their remote windswept coastal rookeries to survive. Most famous among these is the flightless kiwi, a forest-dwelling bird that filled a niche normally occupied by mammals.

Apart from two small bats, that also took to 'walking' rather than flying, there were no mammals in New Zealand. Here, the role of predator fell to birds, such as the New Zealand falcon and the huge Haast's eagle, the latter now extinct along with its main prey, the giant moa. Other unique animals also succumbed to the

impact of humans and their introduced species, while some only just survived.

The tuatara, a lizard-like reptile that roamed the islands of emerging New Zealand when dinosaurs ruled the Earth, and the giant tusked weta, an ancient wingless relative of crickets and grasshoppers, are still threatened with extinction. Unique trees, such as the kauri, the kahikatea, and the totara, have survived but their range has been dramatically reduced. In the higher latitudes and altitudes are the southern beech forests which once formed great swathes through the part of Gondwana which united New Zealand, Antarctica, and southern South America.

The evolution of fisheries management in New Zealand

Capacity problems in New Zealand's inshore fisheries began to manifest themselves in the 1960s. Local fishermen complained that the government was licensing foreign offshore fishing vessels, whilst restricting access to domestic vessels. Consequently, in 1963 the government removed the restrictions on fishing effort applied to local fishermen and in 1965 provided guarantees on loans for fishing vessel purchases. Through these measures the government established both an open access policy with regard to fishery resources and

provided mechanisms to aid a marked increase in the capacity of the country's fishing fleet.

While the intention was to base fisheries development on the offshore resources, the fishing effort in the prime inshore fisheries also expanded rapidly. By the early 1980s, over fishing of species in these zones and overcapitalization within the inshore fleets were rapidly depleting fish stocks. In response, the government (i) set up controlled inshore fishing zones, a new licensing regime that limited vessel numbers and prohibited new entrants to the inshore fisheries; (ii) removed "part-time" fishermen from the inshore fisheries; (iii) enabled regulation of fisheries using management plans formulated after extensive public consultation on the resources to be managed and the regulatory controls (on fisheries inputs) to be applied.

During the lengthy consultation and planning process, over fishing and overcapitalization intensified. By 1984, the inshore harvesting sector was over capitalized by an estimated NZ\$28 million and correction would mean the retirement of 44 per cent of the existing fishing capacity. Ultimately, Government and industry agreed to introduce total allowable catches (TACs) to ensure stock conservation, and individual transferable quotas (ITQs) to facilitate industry restructuring. Both parties agreed the initial TACs and ITQs would be set so as to effect a reduction in fishing activity. The main elements of the scheme were: (i) the allocation of a case history to each fisherman, on a national basis (with case history defined as the fisherman's catch in two of the three years between 1981 and 1983); and (ii) the buy-back of case histories to a level that is equivalent to the TAC for each fishery.

The government ultimately spent over NZ\$45 million in legal fees and in buying out 15800 tonnes of fishermen's case histories. The important outcome was

The extensive consultation with fishing industry representatives in the planning, development and implementation of the quota management system was an important element in the successful introduction of ITQs. ITQ management was established for 29 species, including 21 inshore and eight deep-water species. By 1996, 33 species were managed under ITQs, representing some 80 per cent of the total commercial catch from New Zealand's EEZ.

that a viable and more sustainable future was secured for the affected fisheries and the industry in general. The remaining fishermen could buy, sell or lease their entitlements without undue government restrictions or the requirement of consent. In addition, they could shift their vessels throughout the year between different for which they had quotas. The government benefited by being able to purchase case histories at prices that did not reflect their full value, owing to the absence of an established ITQ market at the time.

The extensive consultation with fishing industry representatives in the planning, development and implementation of the quota management system was an important element in the successful introduction of ITQs. ITQ management was established for 29 species, including 21 inshore and eight deep-water species. By 1996, 33 species were managed under ITQs, representing some 80 per cent of the total commercial catch from New Zealand's EEZ.

There are approximately 117 species currently outside the quota management system and these are being managed by a system of permits and regulations. The government intends to bring additional species into the quota system and at present a moratorium has been placed on the issuance of new permits for non-ITQ species as a means of controlling the fishing effort prior to these species inclusion in the quota management system.

The introduction of ITQs, together with the financial assistance in restructuring, retired 15800 tonnes of catch from New Zealand fisheries. The reduction in the size of the fleet, whether it was due to this assistance scheme or to the subsequent introduction of ITQs, was dramatic. The number of vessels dropped by 22 per cent between 1983/84 and 1986/87 and there was a further 53 per cent reduction resulting from the use of ITQs between 1986/87 and 1994/95. However, as this rationalization primarily occurred in the country's inshore fisheries, it helped their conservation and redirected investment to harvest deep-water fisheries.

Construction companies and the WASTE-WISE Programme

Australia and New Zealand generate enormous amounts of construction and demolition (C & D) waste; in Melbourne alone, some 4.18 million tonnes of C & D waste is generated each year.

The WASTE-WISE Programme was designed to reduce the amount of the construction waste going to landfill, thereby extending the life of landfills and reducing the costs of wastage to the construction industry. In the first phases of the Programme, five leading Australian construction companies volunteered to work with the Australian and New Zealand Environment and Conservation Council to develop waste reduction, recycling and reuse best practice guidelines.

The Programme identified and addressed the technical and behavioral barriers to efficiently and economically reducing waste. As a result a significant volume of building material waste, including concrete and steel, are now being reused and recycled. The companies participating in phase one of the programme found that waste reduction practices improved their commercial prospects both in Australia and overseas. New jobs were created and increased profits were made through the processing and marketing of recovered construction waste. Participating companies also found that good waste management practices positively influenced the companies work practices and corporate identity. The achievements of the participating companies (Bovis Lend Lease, Multiplex, John Holland, Fletcher Construction and Barclay Mowlem) were as follows:

- Bovis Lend Lease Pty Ltd. recycled 98 per cent of the waste material arising from the State Office Block site in Sydney and 90 per cent of the company's waste concrete and steel was sent to recycling centres.
- Multiplex recycled 60 per cent of site waste at the Homebush Bay Olympic Stadium site between April and August 1997, and established an innovative concrete reuse system where 32000 cubic metres of concrete was crushed and then reused on site.

- John Holland reused or recycled 760 kilograms of building material on John Holland sites in one year.
- Forty-three per cent of waste from the Dandenong Police and Court Buildings site was reused or recycled by Fletcher Construction, thereby saving 55 per cent of its waste removal costs.
- At the Vantage Apartments site in Queensland, Barclay Mowlem, 55 per cent of the timber and wooden formwork was recovered and recycled and, across all operations, waste materials such as concrete, bricks, sand gravel, soil, steel, metal framing and roofing was collected and sent to recycling facilities.

By reducing the amount of construction waste going to landfill, companies participating in the WASTE WISE Programme made a significant and measurable impact and set the scene for an expansion of the programme to other parts of the Australian and New Zealand construction industry.

Environmental indicators: Monitoring the vital signs

New Zealand's unique environment has become a major component in marketing strategies for both our primary produce and our tourist attractions. In addition to our unusual birds, bats, frogs, and lizards, we do have clean air, fresh water, and green pastures compared to many countries. However, our environment has undergone massive changes in a very short time, and it is under constant pressure from human activities. In many cases, we do not know what changes are occurring within the atmosphere, our rivers, and our soils, why they are occurring, and the best way of stopping them. Good information is needed to make good decisions about the environment.

One form of information is the environmental indicator. An indicator is something that is measured regularly to show trends or sudden changes in the state of a system, population or individual. Simple indicators measure a single characteristic (e.g. the concentration of ozone in the atmosphere) while composite indicators combine information from several characteristics. The ecological footprint is an example of a composite indicator. It combines information on land area, land use, consumption of land-based resources and population size to show how much land is needed to maintain the lifestyle of an average member of the population. The power of an indicator, whether it is simple or composite, lies in its ability to tell us whether things are getting better or worse.

Economists have used indicators to monitor the 'health' of the economy for many years. They have watched the fluctuations in economic indicators, such as food prices, house prices, the CPI (Consumer Price Index) and the GDP (Gross Domestic Product), to show the pressures on the economy, the state of the economy, and the effectiveness of any responses. Volumes of economic information are produced each month. Environmental scientists are not so well off. A number of nationally coordinated monitoring programmes do exist for such

things as weather, some rivers, shallow lakes, groundwater, atmospheric ozone and greenhouse gases, marine toxic algae, and commercial fish catches. But the vast majority of environmental monitoring is not coordinated or standardised across the nation. One of the reasons for this is the decentralised nature of New Zealand's environmental management system.

The Resource Management Act 1991 requires the Minister for the Environment to monitor the effect and implementation of the Act and to monitor and investigate other matters of environmental significance as necessary. It also requires the Minister of Conservation to monitor the effect and implementation of coastal policy statements and permits. However, the main responsibility for environmental monitoring under the Act falls to local authorities. Because these are only required to monitor aspects of the environment relevant to their region, national environmental information is often difficult to assemble.

A national Environmental Indicators and Monitoring Programme is now being developed for New Zealand by the Ministry for the Environment (1996a and 1996b). The idea is to standardise the key indicators being monitored throughout the country so that monitoring costs and expertise can be shared among local authorities, useful comparisons can be made between localities, and national trends can be identified. The programme has focused initially on indicators for land, water, and air and will then proceed to develop indicators for: waste; indigenous habitat and biodiversity; pests, weeds, and diseases; fisheries resources; energy; climate change; ozone depletion; and transport. The intention is to have the core set of indicators in place by the turn of the century allowing the environment to stand alongside economic and social considerations in the development of sound policy and equitable laws in the new millennium.

[Source: The State of New Zealand's Environment]

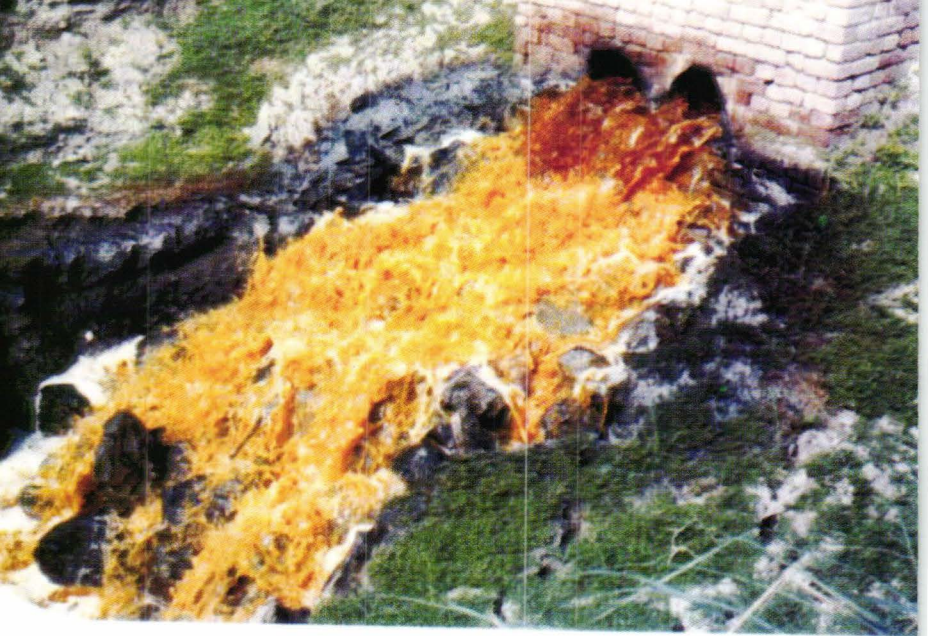


PAKISTAN

Marshalling environment in the media



State of Commonwealth Environment



Effluent discharge from a Chemical Industry without treatment



Marshalling environment in the media

By Zaigham Khan

Pakistan is among the few lucky countries to have a full-fledged National Conservation Strategy (NCS) since 1992. However, the NCS has been an unlucky document as its take-off coincided with the launch of donor-driven Social Action Program (SAP). The latter had addressed at least four out of fifteen areas of NCS. Secondly, both the programs have competed to solicit donors' money to materialize their goals.

In the Eighth five-year plan (1993-98) environment could not attract much resources and emphasis remained confined to mere awareness, advocacy, legal framework and institutional strengthening. However, the approach towards environment in the 9th five-year plan (1998-2003) appears to be a bit different. Environment is seen as an activity cutting across all sectors. Similarly, a need for action has been emphasized over mere awareness because the nation is already paying a heavy cost for inaction.

The country now has comprehensive environmental legislation but a unique apathy exists towards its enforcement. Most of the green non-government organizations (NGOs) and the federal ministry of environment also appear prisoners of reports and research culture. Of course, such a practice produced essential wealth of knowledge to comprehend environmental concerns but cannot be a substitute to action.

Mere emphasis on phantom economic

The country now has comprehensive environmental legislation but a unique apathy exists towards its enforcement. Most of the green non-government organizations (NGOs) and the federal ministry of environment also appear prisoners of reports and research culture. Of course, such a practice produced essential wealth of knowledge to comprehend environmental concerns but cannot be a substitute to action.

The country's monitoring and implementation mechanisms are also weak. Though millions of dollars have been spent on strengthening provincial environmental protection agencies, still many do not have proper laboratories and trained staff to handle new realities.

growth has further worsened the country's ecological resource base. The result is that the 1990s have been a decade of natural disasters such as devastating floods, water logging and viral attacks on the country's major and medium crops such as cotton and wheat. These disasters have been man-made with their roots in overuse of fertilizers, pesticides, irrigation and reckless removal of natural vegetation.

As much as 26.5 million hectares or 42 percent of the total land is estimated to be suffering to varying degrees from the afflictions like wind erosion, salination, water-logging, nutrients depletion and overgrazing. According to conservative

estimates over the past 30 years, use of fertilizers has grown 119 times, pesticides 95 times and irrigation 100 percent. The juxtaposed reality remains that the country is losing 25% of its potential crop production.

Similarly, industrial pollution is estimated to be worsening at a rate more than twice as fast as the growth of economy. A study of recent 25 years (ie. 1963-88) calculated it at 6 to 10 percent whereas the industrial growth rate was just 3 percent out of country's 50,000 industrial units, according to Economic Survey of Pakistan, 1997-98, only 3 percent have proper waste treatment plants or technologies. The rest discharge their untreated effluent into rivers, lakes and sea. The pollutant industry is also reluctant to adhere to National Environmental Quality Standards (NEQS) introduced in July 1996. After series of negotiations, it was expected that NEQS will be voluntarily enforced January 1999 onwards. But the third deadline since July 1996 has once again passed silently.

The country's monitoring and implementation mechanisms are also weak. Though millions of dollars have been spent on strengthening provincial environmental protection agencies, still many do not have proper laboratories and trained staff to handle new realities.

There is plethora of green laws in the country, which make

Environmental Impact Assessment (EIA) an essential prerequisite for all big and small ventures. But motorways are being constructed without any authentic EIAs. Not only this, industrial zones are being promised on agriculturally active lands of the country adjacent to motorways. A catastrophe is in the offing.

Vehicular emissions have also made life miserable in Pakistan. It has been estimated that an average vehicle in Pakistan emits 15-20 times more pollutants than an average vehicle in the developed world. The number of vehicles has also tripled in the last 15 years and it is growing at an annual rate of 11.79 percent. Traffic jams, dust and smoke along with increasing noise pollution are resulting in less patience among people which is adding to urban violence.

Media definitely has a crucial role to play in this scenario. Media in Pakistan can be subdivided into three main categories: officially controlled electronic media, independent press which can be further subdivided into English and vernacular press and the alternative publications.

Environment is getting more and more coverage on state run radio and television. The reporting of environment on the electronic media, however, remains shallow and is rarely critical of the government or its agencies. The Pakistan Television also occasionally runs such programs as the National Geographic and The Living Planet. Some of these programmes are dubbed in Urdu. An independent television channel NTM seems more sympathetic to environmental concerns but lacks the nerve to challenge the government. Radio, which is extremely popular in the rural areas, is still caught in the discourse of the Green Revolution. It can be mentioned here that radio had an important role in the 60s and 70s in teaching farmers the new techniques of agriculture and a number of its programmes became very popular with farmers.

There obviously appears need for more airtime on issues of environment and development. But more urgent is the need to make effective use of whatever

There obviously appears need for more airtime on issues of environment and development. But more urgent is the need to make effective use of whatever airtime is available on radio and television.

Despite all these limitations, print media in Pakistan has at times succeeded in building strong pressure on environmental issues and making some difference.

airtime is available on radio and television. Apart from the official control, another problem with the official electronic media appears to be lack of orientation of policy makers and producers on the environmental issues. Journalists working in official electronic media are usually shunned by journalists in print media who do not consider their genuine journalists and they don't seem to have much interaction with environments NGOs either. Forum of

Environmental Journalists Pakistan (FEJP) is trying to bridge the gap by involving professionals from government controlled electronic media in its programs. They are invited to become members of the forum and join in most of the Forum's activities.

Video is one effective electronic medium that is completely out of any official control in Pakistan. World Wide Fund for Nature (WWF) Pakistan and FEJP this year arranged a countrywide Moving Film Festival. This festival started in May and ended in July. It traveled to six cities in the four provinces and was well received everywhere.

Fortunately, Pakistan has a vibrant independent press, which has a strong tradition of criticizing the government and exposing its negligence to the public. The press in Pakistan is unluckily sharply divided in English and vernacular newspapers. English language newspapers and magazine give more coverage to the environmental issues. Among the mainstream English language newspapers daily Dawn and The News International has separate sections on environment while environment also gets good coverage in The Nation. Among the magazines, Herald and Newline, Pakistan's, the most influential English language magazines give prominent coverage to environment.

English language publications have produced quite a few journalists who have made their names in the reporting of environment and development. Two such reporters, one from The News and the other from the Newline, incidentally both women, have won Global 500 Awards.

Though the English language publications are considered very

important due to the kind of readership they attract, it is the vernacular press that is read by the common man. The largest number of Pakistani newspapers and magazines with widest circulation are printed in Urdu and Sindhi languages. The situation does not appear as good in vernacular press. Though the environment does get some coverage in Urdu press, the news items are mostly ill informed, out of context and shallow.

Environment appears as a serious political issue in the Sindhi press due to the inter-provincial discords over water resources, particularly distribution of the Indus waters. These newspapers take a regional stand on the issue of water distribution, construction of big dams and the construction of large drainage programmes.

Despite all these limitations, print media in Pakistan has at times succeeded in building strong pressure on environmental issues and making some difference. Two years ago, for example, press in Pakistan took a strong stand against construction of a highway through Kirthar National Park in the Sindh province, forcing the government to change its plans. Similarly, press stopped an industrialist from setting up an industrial unit in Lahore, which was based on discarded European technology and was potentially harmful to environment. At the moment, a campaign is on to force government from gas exploration in a national park.

NGOs in Pakistan have experimented with a number of alternative publications. The World Conservation Union (IUCN) brings out two quarterly environmental publications: Way Ahead is in English while Jareeda is in Urdu. Both the magazines are considered excellent specimens of environmental journalism and are very popular among the readers interested in environment. World Wide Fund for Nature (WWF) brings out a quarterly magazine Nature. The magazine usually carries articles written by environmental experts and is a good effort. A number of other NGOs

It was realized more than ten years ago that an organization environmental journalists was necessary to sensitize media over environmental issues. An active effort to reactive the organization was started in 1987. A number of meetings of environmental journalists were held. Environmental journalist agreed to form a countrywide network.

also bring out newsletters in which environment gets prominent coverage.

Green Press, an organization of environmental journalists affiliated with FEJP runs a feature service on environment, Green Wire and a weekly electronic magazine Green News.

It was realized more than ten years ago that an organization environmental journalists was necessary to sensitize media over environmental issues. An active effort to reactive the organization was started in 1987. A number of meetings of environmental journalists were held. Environmental journalist agreed to form a countrywide network. The organization first started Pakistan Forum of Environmental Journalist (PFEJ). Later decided to change its name of Environmental Journalists Pakistan (FEJP). Two organizations of environmental Journalists (FFEJP) were formed while the PFEJ was in hibernation. Both these organizations decided to affiliate with the FEJP and are now Islamabad and NWFP chapter of the Forum.

Last two years, FEJP has organized a number of training seminars, study tours and other events. It has been able to turn itself into an effective countrywide network of media people interested in environment and development. Even as the situation of environmental degradation in Pakistan appears quite gloomy, prospectus of environmental journalism appear bright. More and more journalists are turning to environment and development and FEJP is fist turning into a strong organization.

The National Conservation Strategy was adopted in March 1992. It addresses the critical state of Pakistan's ecosystem and suggests a comprehensive set of actions to preserve and enhance the country's environment. A review of the state of the natural environment is followed by a number of policy options for sustainable development. The document has a complete chapter on communication of green messages through over 300 newspapers, 100 weeklies and monthlies, electronic media and other performing arts. Federal Ministry of Environment, the IUCN and All Pakistan Newspapers Society decorate environmental journalists every year.

Private initiative towards urban waste management

Rotting garbage creating a health hazard is a common sight in many parts of Karachi. It is also a civic menace for city-dwellers. Municipal authorities have failed to address the issue of solid waste disposal due to lack of capacity. Once it leaves the house, waste is often dumped on any vacant plot of land, or on streets, for want of a proper neighbourhood dumpsite. Where a site exists-usually a low-four-wall structure open to the air-waste is more likely to be found lying outside rather than within this makeshift "receptacle". Scavengers rummage there for recyclables, but a large part of garbage remains because there is no regular waste collection service to ensure that the waste is cleared away daily. Waste Busters, a private enterprise has now become active to offer a solution to the poor.

Waste Busters began life three years ago as the Lahore Sanitation Programme. They aimed at providing solid waste disposal services through recycling. They are now called Waste Busters and have branches in Islamabad and Karachi. For Rs 100 a month Waste Busters provide a daily collection service to households who share a concern for the environment. In Lahore, Waste Busters service 10000 eco-conscious households in Gulberg, Shadman, Model Town, Muslim Town and Cantonment areas. They employ 200 people and an average 50 tonnes of waste is collected and disposed of daily.

In order to manage waste properly, collection isn't enough. Waste Busters now sorts out materials like plastic, glass, paper and organic waste retrieved for recycling purpose. The enterprise divides the city into zones and each zone requires a transfer station where the waste is taken after being collected, for sorting.

In Lahore, organic waste is being efficiently sorted and turned into compost which is sold to farmers and nurseries to be used as fertilizer. The sorting is done at transfer stations set up by Waste Busters at sites allocated by the local municipal administration.

Unfortunately, sorting at source, the mode employed in the West, doesn't work in Lahore. The Waste Busters tried getting households just to separate the organic waste from other household waste but it didn't happen.

Waste Busters are not keen to incur the wrath of the big waste dealers, nor do they want to rob scavengers of their livelihood "In fact, in Lahore they invite the scavengers to their transfer stations to sort the waste for them and buy it off them."

Eventually the Waste Busters would like to progress from a self-sustaining to a profitable operation. That has already begun to happen in Lahore where the daily production of an average 500 bags of the organic fertilizer, along with the sale of other recyclable material to recycling industries, has brought Waste Busters out of the red.

Community-based approaches: The Orangi Pilot Project in Pakistan

Orangi Township is situated in the Orangi Hills in the western part of Karachi. It has the distinction of being the world's largest katchi abadi or "squatter" settlement. Spread over an area of 8000 acres, it currently houses about a million people living in about 100,000 housing units, which people have constructed themselves with the help from the informal sector. The Township was originally created by land-grabbers through illegal occupation and subdivision of state land in the 1960s. Bits were then parceled out and sold to poor people who either did not know that they were getting land through illegal channels, or had no other option. The Township was later "regularized" by the provincial government and the city administration. While it was easier to give titles or occupied plots of land to the occupiers, it was most difficult to provide environmental services and take up the task of cleaning up the environment of unplanned huts and housings, with sewerage running across open spaces, lanes, and streets or roads. The extent of morbidity and mortality, was daunting.

The Orangi Pilot Project (OPP) was established in 1981 to meet these huge environmental poverty challenges. It is one of the first projects in the world that has tackled poverty and environment issues within the same package. In an approach that was very futuristic, OPP recognized right from the beginning that the spiral or poverty-population-environment would have to be tackled as whole, by the people themselves. Its entry point for intervention through community sanitation and health, therefore, went hand in hand with housing population programme and entrepreneurship development. At the same time, links were also established with relevant government agencies for regularizing the status of ownership, and for, what was referred to as, "external" development (such as the laying down of the trunk sewers).

People were organized to first delineate their "lanes". Everyone living in a lane had to contribute its clean up and towards the cost of building sewer lines in those lanes. Households build their own internal disposal system and the

connection to the sewer line. These sewer lines were then connected to secondary sewer lines. City agencies put in the main trunk sewers. Local masons were trained to make low-cost bricks used in the construction of these sewers (and also for housing). Community groups had to purchase construction material from these small local producers. The programme, therefore, boosted local economic activity while tackling the living environment.

Credit programmes helped to alleviate poverty, while technical assistance for better housing led to both increased local economic activity, as well as healthier and more sanitary homes. The health and population programme tackled reproductive health and morbidity, as well as preventive measures. The education programme (developed with the private sector through micro-credit) has been so successful, that Orangi has one of the highest rates in the country. A network of over 100 clinics are also involved in preventative, curative and reproductive health care, now managed by an OPP offshoot called OP-KHASDA. These services have had a direct impact on controlling population growth. the OPP has another very distinctive feature. It does not have "targets" or "time frames" in the conventional sense. The "process" participation and self-financing for improving the living environment of the poor -- was and is paramount.

The outstanding achievement of OPP can be gauged from the fact under its sanitation programme in Orangi alone 6 000 plus main sewer lines have been established with a total length of 1.5 million rft. 400 plus secondary sewers have been constructed with total length of 165000 plus rft. In addition 91000 plus latrines have also been constructed. The community or people of Orangi have invested over Rs 79 million (about US\$ 1.6 million) in just this one programme to improve their environment. Having paid for part of this system themselves, they own it and look after it, so that the choked and stinking lanes and unhygienic homes have been "greened" by a functioning system of sanitation. Under its entrepreneurship development programme OPP disbursed loans worth about Rs 118 million (US\$ 2.2 million) to the poor in 63 professions between september 1987 and November 1989 alone, helping them to become

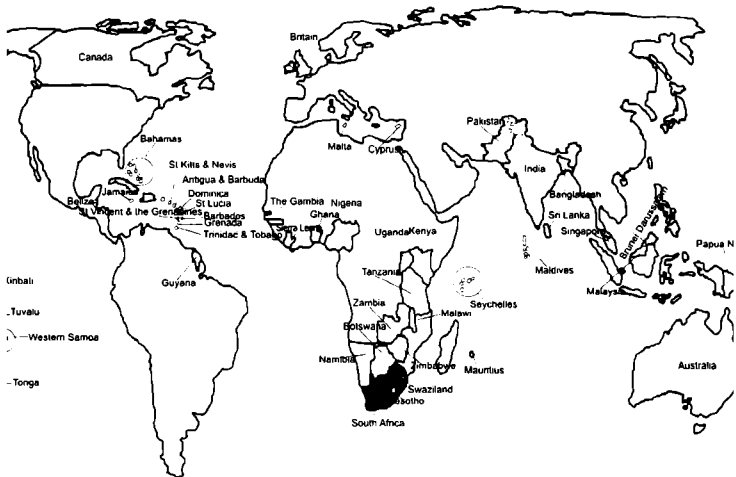
entrepreneurs and set up their own small businesses. About Rs 18 million worth of loans have gone to about 1200 women entrepreneurs. The entrepreneurs have paid back Rs 91 million of the principle and Rs 22 million as markup. This programme has had a positive impact on the reduction of poverty.

Over the past two decades, OPP has expanded tremendously and multiplied into many separate institutions across Pakistan, some of which have been handed over to local groups. The flagship operation is now known as OPP-RTI, where RTI stands for Research and Training Institute. Its models have been emulated widely across the country and abroad.

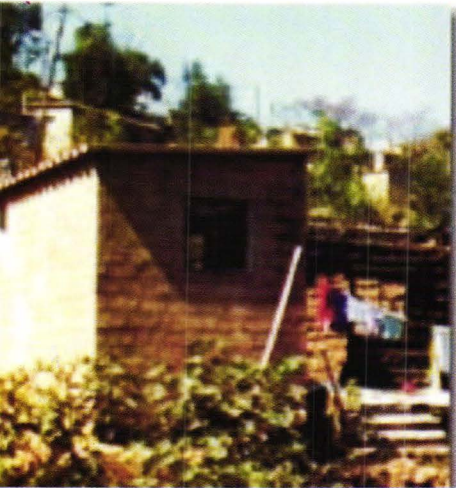
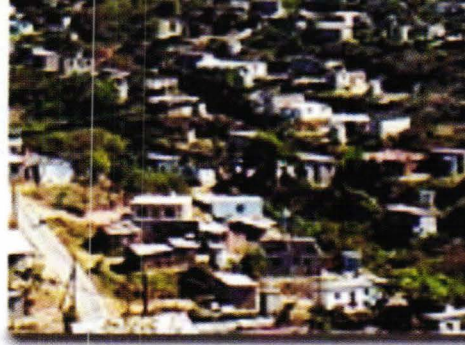


SOUTH AFRICA

Climatically sensitive



State of Commonwealth Environment



Climatically sensitive

The South African 3,000-km coastline has approximately 370 outlets to the sea ranging from small coastal streams to large, permanently open tidal estuaries. The current state of scientific information on the vast majority of these systems, however, is virtually nil.

As part of a national programme to assess the state of South Africa's estuarine environment, 'basic surveys were conducted on these systems during the period 1992 to 1999. This included ichthyofauna (fish), water quality, and geomorphological and aesthetic observations. Some 6 per cent of South Africa's 'estuaries' have been surveyed to date. This baseline data has been analysed and synthesised to render it understandable to the non-specialist but at a sufficiently high level to inform potential end users of the state of South Africa's estuaries.

A conceptual classification of the geomorphic variability among South Africa's estuaries has been produced. Several systems particularly on the west coast were not considered estuaries either due to their small size, their ephemeral nature, or because they were essentially isolated. Six basic estuary types were identified. These were divided into normally open and normally closed systems. Two types of normally closed estuaries were recognised. These were systems where the water level was typically perched above sea level and those where the water level was approximately at sea level.

In this report, however, the normally closed estuaries were sub-divided into small, medium, and large systems based

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Aspects of the fish community structure of each geomorphic estuary type were investigated and each estuary type appeared to contain fairly distinctive fish assemblages although some overlap did exist.

The fish community structure (species richness, composition and relative abundance) of each estuary type within each bio-geographic region was described and this was used as a reference against which each estuary could be assessed.

on surface area. The normally open systems were divided into barred and non-barred estuaries. Two types of permanently open barred estuaries were recognised: river-dominated and tide-dominated systems.

In this report the two types of normally open barred estuaries were not identified but were sub-divided into small and medium to large systems based on their mean annual runoff.

Based on the ichthyofaunal data and the geomorphological classification, the three bio-geographic regions that characterise the coastline were identified and delineated. These were the cool-temperate regions from the Gariep (Orange River) estuary to Cape Agulhas, the warm-temperate region from Cape Agulhas to and including the Mdumbi estuary, and the subtropical region from the Mdumbi to Kosi Bay.

Aspects of the fish community structure of each geomorphic estuary type were investigated and each estuary type appeared to contain fairly distinctive fish assemblages although some overlap did exist. The fish community structure (species richness, composition and relative abundance) of each estuary type within each bio-geographic region was described and this was used as a reference against which each estuary could be assessed.

In terms of their species richness, composition and relative abundance, two systems (8 percent) in the cool-temperate region had low ratings. Ten estuaries (42 percent) were rated as moderate and the remaining 12 systems (50 percent) had a good overall rating. Of a total of 119 estuaries analysed in the warm-temperate region, nine (8 percent) had a relatively poor overall rating, 35 (29 percent) were rated moderate and the remaining 75 (63 percent) had a good overall rating. In the subtropical region, three estuaries (5 percent) were rated poor, 23 (36 percent) had a moderate overall rating and the remaining 37 (59

percent) had a good rating.

The results of the water quality surveys were summarised into an estuarine water quality index (eWQI) to provide a 'snapshot' of the average water quality of South Africa's estuaries. Six indicators of estuarine water quality were chosen and these were divided into three categories: suitability for aquatic life (dissolved oxygen, oxygen absorbed, unionised ammonia), suitability for human contact (faecal coliforms), and trophic status (nitrate nitrogen, ortho-phosphate). The effect of including/removing chlorophyll-a in the water quality index was also tested. The results indicated that the exclusion of chlorophyll had no significant effect on the relative index ranking for the estuaries tested.

The sensitivity of the index to various aggregation formulas was also tested. Alternative formulations did not significantly alter the relative ranking of the estuaries tested. Using the eWQI values, five water quality classes were identified. Approximately 74 percent of all the systems sampled were classified in a "Fair" or better condition. The remaining 26 percent were classed as "Poor" or "Very Poor". Systems on the south and south-east coasts had the best overall water quality with a preponderance of estuaries classed as "Good" or "Very Good".

Estuaries on the Transkei and KwaZulu-Natal had a relatively high proportion of systems in "Poor" condition.

Aesthetic observations on each estuary were divided into 14 weighted categories: floodplain land use, shoreline status, estuary surrounds, bridges, dams and weirs, mouth stabilisation, litter and rubble, human use, algae growth, turbidity, odour, air pollution, noise, and invasive and exotic vegetation. The aesthetic state of each estuary was assessed according to the type and degree of impairment to each category.

Overall, 251 systems were assessed and 18 (7 percent) had relatively poor aesthetic ratings, 88 (35 percent) were

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The results of this study provide a useful summary of the status of South Africa's estuaries, however, there exists a need to make all of the basic data, as well as various forms of summarised data, available to interested parties from scientists to managers and even the general public. Furthermore, much of the baseline data collected during these surveys has not been fully analysed. The assessment of the fish fauna was only based on a few components of the fish community. Other aspects of community structure such as bio-mass composition, life-history styles and trophic structure should be investigated. In terms of water quality, a physical water quality impairment category involving such indicators as temperature, salinity, pH, and turbidity should be explored. Also water quality rating curves for different estuary types should be investigated.

There are also some obvious significant gaps in the database. A number of estuaries, particularly in the Transkei, have not been sampled and these gaps need to be filled. The

There is also a lack of a cohesive plan for temporal monitoring of key systems.

Investigations into other estuarine components (e.g. hydrology, sediment biogeochemistry, vegetation, zooplankton, zoobenthos, birds, habitat assessment, and catchment land-use) should also be undertaken to ensure a more complete appraisal of the ecological integrity of the nation's estuarine resource.

geomorphological classification is based only on available data and additional information is required to improve its resolution for example data on mouth condition and tidal prisms.

Long-term data sets are also required to establish the range of the natural variation between and within estuaries on a seasonal basis. This would provide a better understanding of how estuaries of various types function, a critical requirement for effectively managing coastal issues such as artificial breaching, estuarine water requirements, eutrophication of estuaries, and biological functioning.

There is also a lack of a cohesive plan for temporal monitoring of key systems. Investigations into other estuarine components (e.g. hydrology, sediment biogeochemistry, vegetation,

zooplankton, zoobenthos, birds, habitat assessment, and catchment land-use) should also be undertaken to ensure a more complete appraisal of the ecological integrity of the nation's estuarine resource.

In order to manage coastal resources effectively, decisions should be made based on sound scientific information and with an agreed and attainable objective for the future state of the coast. Progress toward achieving these goals should be monitored against the pre-existing baseline. In an assessment of the current state of scientific knowledge of South African estuaries, Whitfield (1995) concluded that, of the 250 systems assessed, the state of information of 68 percent was "nil" to "poor". Of the remaining estuaries, the state of information of 22 percent was classified as "moderate" while only 10 percent were regarded as having "good" or "excellent" information. Thus the necessary baseline information did not exist that would permit effective management of coastal resources.

There are approximately 370 river outlets along the South African coast. During the period 1992 to 1999 a national survey was conducted on some 250 systems by the authors. This represents approximately 67 percent of the country's 'estuaries'. Aspects of their geomorphology, fish communities, water quality and aesthetic state were investigated.

This information was analysed and condensed to provide an assessment of the state of the nations estuaries. The use of indices is an effective method of communicating technical information to potential end-users who typically do not have any scientific background. It has been pointed out, however, that the use of a composite index incorporating a number of parameters can lead to a loss of information as a result of oversimplification (Morant & Quinn, 1999). It is suggested that a matrix method should be adopted so that the ratings of each component of the estuarine environment can clearly be seen.

Thus, some estuaries will be seen to be important in respect of a single component whereas others may be important in respect of two or more components. Estuaries can be assessed in this way to provide ratings on a national, regional (political or biogeographical) or local scale (Morant & Quinn, 1999).

The species richness, species composition and relative abundance of the ichthyofauna of the various types of estuary were described for each region. Using these fish community characteristics as a reference, the state of the ichthyofauna of each estuary was assessed. Overall, 14 systems (7 percent) had a relatively low rating, 68 (33 percent) had a moderate rating and 124 (60 percent) had a relatively good rating.

Thus, some estuaries will be seen to be important in respect of a single component whereas others may be important in respect of two or more components. Estuaries can be assessed in this way to provide ratings on a national, regional (political or biogeographical) or local scale (Morant & Quinn, 1999).

A geomorphological classification of these systems revealed that many systems, particularly on the west coast, were not considered to be estuaries in any accepted definition either because they were dry or due to their small size. Six basic types of estuary were identified. There were divided into estuaries, which were normally open and systems, which were normally closed.

The normally open estuaries were further divided into barred and non-barred systems. The barred estuaries could be classified according to the processes, which maintain connection with the sea, that is river-dominated systems and tide-dominated systems. A lack of data, however, has only permitted a classification of these systems into small and medium to large estuaries based on mean annual runoff (MAR).

Two types of normally closed estuaries were recognised, those where the normal water level was perched above sea level, and those where the water level was approximately at sea level. Again a lack of sufficient data only permitted these systems to be classified into large medium and small estuaries based on surface area. A total of 206 estuaries were classified geomorphologically.

This approach identifies for each type of estuary, a potential mode of physical behaviour related to tidal exchange, sediment transport, response to fluvial floods etc. Although a number of estuary types have been studied, there are several in which limited research has been undertaken and their physical processes are poorly understood. There may be differences within groups that relate to unidentified differences and these

too are worthy of further consideration. The classification enables a management perspective that does not simply deal with the open estuaries or the large estuaries, but recognises that a range of estuary types exists and that examples of each type should be preserved.

Based on ichthyofaunal surveys and the classification of the 206 estuaries, three biogeographic regions were identified. These were the cool-temperate region from the Gariep (Orange River) Estuary to Cape Agulhas, the warm-temperate region from Cape Agulhas to the Mdumbi Estuary, and the subtropical region from the Mdumbi Estuary to Kosi Bay. The various estuary types within each biogeographic region appeared to contain fairly distinctive fish assemblages.

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Water quality surveys were conducted on some 250 systems. The water quality of each estuary was assessed in terms of its suitability for aquatic life (dissolved oxygen, oxygen absorbed, unionised ammonia), its trophic status (nitrate nitrogen, ortho-phosphate), and its suitability for human contact (faecal coliforms). Overall, approximately 74 percent of all the systems were classified as in a "Fair" or better condition. The remaining 24 percent were rated as "Poor" or "Very Poor". The approach we have adopted enables the category of impairment to be identified and prompts further study in estuaries identified as having poor water quality.

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Climate change is a world-wide concern, which receives much attention in scientific and political circles.

The measured atmospheric concentrations of several important gases in terms of their contribution to the enhanced greenhouse effect, are increasing.

The aesthetic state of 251 systems was assessed during this study, 18 (7 percent) had relatively poor aesthetic ratings, 88 (35 percent) had a moderate rating and 145 (58 percent) were rated relatively good aesthetically. This finding indicates the relatively localised high levels of aesthetic impairment adjacent to urban centres. It also indicates the high level of modification of the estuarine landscape through human activities. While this may not directly impact on the natural environment, it serves to indicate the level of development centred on estuaries.

Climate change

Global climate change, which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods. Any factor which alters the radiation received from the Sun or lost to space, or which alters the radiation received from the Sun or lost to space, or which alters the redistribution of energy within the atmosphere, and between the atmosphere, land and ocean, can affect climate. Climate change is a world-wide concern, which receives much attention in scientific and political circles. The measured atmospheric concentrations of several important gases in terms of their contribution to the enhanced greenhouse effect, are increasing. Although the possible consequences of these increased concentrations are not yet all known or proven, it is accepted world wide that human activities are the probable cause of the observed changes in the atmosphere and climate (IPCC), 1995).

South Africa is a climatically sensitive country. Most crop agriculture in South Africa takes place where it is only just climatically viable, particularly with respect to rainfall. Water is the resource most limiting to national development. Its availability now and in the future is closely linked to rainfall, temperature, and management of water resources and land use practices.

A warmer world will cause the sea level to rise, mainly due to expansion of the water in the oceans. This will negatively impact coastal ecosystems, water supplies and infrastructure in coastal regions, via salt contamination of fresh ground and surface water, and erosion and corrosion of buildings and other infrastructures.

South Africa has a coastline of nearly 3000 km; however most of this is fairly steep and will not be significantly affected by small sea level rises (for example the current rise of 1.2 mm per year).

South Africa has a climate, which is highly variable, both across the country and over time. In general it is a dry country especially in the west (the mean annual rainfall is 496 mm, approximately half the world average). Rainfall is mainly received in summer, except in the southwest, which is a winter rainfall region, and a small area in the southern Cape, where rain can occur at any time of the year. Summer temperatures are generally warm and the maximum can frequently be very hot (above 35° C). While winters are not extremely cold, night time minimum temperatures drop below freezing for at least 30 days a year over the entire high-lying interior, about 50 percent of the country (Tyson, 1986).

South Africa shares its atmosphere with the rest of the world when it comes to long-lived gases such as carbon dioxide, methane, nitrous oxide and chlorofluorocarbons. For short-lived gases such as nitric oxide, sulphur dioxide and for dust particles, we share our atmosphere with the neighbouring countries in southern Africa. There are numerous 'natural' sources of atmospheric pollutants, such as field fires, in addition to the industrial sources. Outdoor air quality is generally worst in urban, industrialised areas, but the poorest air quality is to be found indoors, frequently in rural areas, in badly-ventilated housing where coal, dung or

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Greater efforts to improve the ambient air quality (for instance by paving of roads in informal settlements), to promote low-smoke fuels and to educate the public on the dangers of open fires inside houses, are necessary.

wood is burned in open hearths without chimneys.

South Africa is sensitive to climate change, and contributed about 1.2 percent to global warming in 1990. The levels of sulphur dioxide, nitric oxide and ozone are on average within the accepted South African guidelines for human health and the prevention of direct ecosystem damage. The measured concentrations at ground level are not currently showing an upward trend.

There are occasions, especially in the major urban areas, where the concentrations of sulphur dioxide, nitric oxide, ozone and smoke particles could lead to further health problems in people who are already experiencing respiratory problems. No trend in the number of times in which these levels are exceeded is apparent, but with more people living in urban areas, the impact is likely to increase.

Indoor air quality constitutes a health hazard in poorly ventilated dwellings without chimneys, where coal, wood, paraffin or dung are used as fuel. The electrification of houses will improve this situation, as will the general improvement in housing design and construction brought about by the national housing policy. Greater efforts to improve the ambient air quality (for instance by paving of roads in informal settlements), to promote low-smoke fuels and to educate the public on the dangers of open fires inside houses, are necessary.

Freshwater

South Africa's available freshwater resources are already almost fully utilised and under stress. At the projected population growth and economic development rates, it is unlikely that the projected demand on water resources in South Africa will be sustainable. Water will increasingly become the limiting resource in South Africa, and supply will become a major restriction to the future socio-economic development of the country, in terms of both the amount of water available and the quality of what is available. At present many water resources are polluted by industrial effluents, domestic and commercial sewage, acid mine drainage, agricultural runoff and litter.

To augment supplies, South Africa is looking towards water sources in other southern African countries (e.g. Lesotho) to assist in providing sufficient water for projected future demands. However, the risks of international dependency on such a priority resource are high. Other possible sources of water, such as desalinisation of seawater and water from icebergs, may be potential options in the long-term, although currently they are too expensive to exploit. It is imperative that South Africa develop both a water-efficient economy together with a social ethic of water conservation and ultimately a culture of sustainability of water resource use.

Groundwater

Similar to surface waters, South Africa's groundwater resources are relatively limited compared to world averages. Of critical importance is the relationship between groundwater and surface water. Groundwater can only be abstracted on a sustainable basis at a rate less than, or equal to, its long-term average recharge through infiltration of rainwater. Already many of the streams that existed at the beginning of the century have dried up due to over-extraction, and groundwater failure is common in some of the more densely populated areas (Basson et al. 1997).

Wetlands

Wetlands are some of the most threatened aquatic habitats in South Africa (Walmsley 1991). Threats to wetlands include human development activities, channelisation, drainage; crop production, and effluent disposal and water abstraction; that is, most human-induced land-use changes. Begg (1986) states that "wetlands formerly occupied between 10 and 15 percent of every catchment in Natal.

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Within the last fifty years wetlands in these same areas have been reduced to a few scattered remnants, and in certain catchments virtually eliminated". This probably applies to the rest of South Africa, but little information is available about the extent of previously existing wetland areas.

South Africa has one of the world's greatest diversity of plant and animal species contained within one country, and is home to many species found nowhere else in the world. Terrestrial resources are rapidly disappearing however, due to conversion of natural habitat to farmland, forestry, human settlement, and industrial development. Some species are under threat from over-collection for medicinal, ornamental, and horticultural purposes.

wetland areas.

Even the present DEA&T database on wetlands is limited to 1,377 wetlands. Of these, 21 percent are marine and estuarine, 21 percent are endorheic pans, 15 percent are riverine, 5 percent are lacustrine, 19 percent are palustrine, and 18 percent are man-made (Cowan and Van Riet 1998). Of the 829 naturally occurring freshwater wetlands, 13.5 percent have full protection within a national park, provincial nature reserve or wildlife sanctuary and 3.9 percent are partly protected (Cowan and Van Riet 1998).

South Africa currently has 16 wetlands designated as wetlands of international importance in accordance with the Ramsar Convention. They are De Hoop Vlei, Barberspan, De Mond State Forest/Heuningnes Estuary, Blesbokspruit, Turtle Beaches/Coral Reefs of Tongaland, St Lucia System, Langebaan, Wilderness Lakes,

Verlorenvlei, Orange River Mouth, Kosi Bay system, Lake Sibaya, Natal Drakensberg Park, Ndumo Game Reserve; Seekoeivlei and Nylsvlei of these; only six are inland, freshwater wetlands.

Estuaries

The present status of estuarine environments is dealt with in the Marine and Coastal section of this report. However, one of the important aspects of the estuarine environment is the amount of freshwater entering the system. River flow through an estuary maintains the salt balance in the estuary and ensures that the estuary mouth remains open.

The environmental water requirements of estuaries as estimated by DWAF (1986) are given in Table 3.3. Where available, data are presented on the present flow through the estuary mouth. The percentage of MAR flowing through the estuary varies considerably for each river, because of aspects

such as climatic variability, level of development, land use and river regulation.

Bio-diversity

South Africa has one of the world's greatest diversity of plant and animal species contained within one country, and is home to many species found nowhere else in the world. Terrestrial resources are rapidly disappearing however, due to conversion of natural habitat to farmland, forestry, human settlement, and industrial development. Some species are under threat from over-collection for medicinal, ornamental, and horticultural purposes.

Invasion by alien species of plants and animals is a major problem in South Africa. Alien organisms can replace large numbers (even whole populations) of native animals and plants, and alien plants use greater quantities of scarce water resources.

Degradation of vegetation and soils is also a widespread problem in South Africa. Rapid population growth and inappropriate government policies in the past encouraged cultivation in unsuitable areas, and use of poor agricultural methods to produce sufficient food.

Terrestrial ecosystems provide human beings with food and raw materials, space for our housing and recreation, and control the air, water, and soil quality. The land on which we live, its condition, and how we use and manage it, are therefore vital components of our existence.

South Africa is characterised by a wide diversity of plant and animal life and is ranked as the third most biologically diverse country in the world (mainly due to the richness of the plant life). Over 18,000 species of vascular plants occur in South Africa, of which over 80% occur nowhere else. Estimates of total species numbers in the country vary from 250,000 to 1,000,000 and it is estimated that South Africa has 5.8 percent of the world's mammal species, 8 percent of the world's bird species, 4.6 percent of the

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However, South Africa also has the highest concentration of threatened plant groups in the world (Cowling & Hilton-Taylor 1994).

Approximately 3,435 of South Africa's plant groups are considered to be globally threatened with extinction (Hilton-Taylor 1996). A further 204 groups are estimated to be threatened at a local level.

world's reptile species, 16 percent of marine fish species and 5.5 percent of the world's recorded insect species (DEAT 1997). Over 10,000 species of the coastal animals and plants (almost 15 percent of the world's total coastal species) are found along South Africa's coast, with about 12 percent of these found nowhere else. In terms of the number of endemic species of mammals, birds, reptiles and amphibians, South Africa ranks as the 5th richest country in Africa and the 24th richest in the world (DEAT 1997). This diversity is caused by variation in climate, geology, and soils and landscape form.

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Hilton-Taylor 1994). Approximately 3,435 of South Africa's plant groups are considered to be globally threatened with extinction (Hilton-Taylor 1996). A further 204 groups are estimated to be threatened at a local level.

South Africa's terrestrial systems are fragile, however, and must be managed carefully. Nearly 91 percent of the country falls within the United Nations definition of "affected dry lands" (UNCCD 1994). These are extraordinarily dry areas where the rainfall is low, and potential evaporation is high. Dry land systems are often very sensitive to change, and therefore need to be managed carefully. For example, crops grown in these areas are usually not irrigated, and depend on rainfall. Drought-induced crop failure can result in direct food shortages at the local level, usually affecting subsistence agriculturists the hardest. Removal of vegetation (ground cover) from dry land areas can increase the risk of soil erosion, making the soil less fertile and less able to support vegetation (natural or cultivated crops) in future.

The maintenance of bio-diversity is a prerequisite for ecosystem sustainability; once extinct, species cannot be brought back. The local extinction of species constitutes

transformation of an ecosystem. The knock-on effects of this contribute to further transformation of the ecosystem. For example large browsers like elephants select certain types of plants from the vegetation, and therefore control the structure of the vegetation, and the species which can survive there (Owen-Smith & Danckwerts 1997).

Local extinction of elephants from, for example, a savanna system, would lead to transformation of the vegetation composition and structure, by increasing the woody component in relation to the grass component. This has further consequences for animals that use both woody and grassy species for food and shelter. Unfortunately, very little is known about the knock-on effects of local extinction and the time scale over which these occur. Good environmental management therefore requires that we apply the "Precautionary Principle" and try to minimise the risk of extinction, until we are sure that the impacts will not be detrimental to ecosystem functioning or to human quality of life. One way of ensuring this is to manage populations of plants and animals within an area, and make sure they do not fall below a minimum viable size (Minimum Viable Population or MVP; Gilpin & Soulé 1986, Soulé 1987). This is the smallest number of individuals, which can reproduce and function normally, even under stressful conditions such as drought.

The surface area of South Africa is 122 million hectares of which 86 percent is classified as agricultural, although most of this is grazing land, rather than crop cultivation. The land ownership reform process which has taken place since 1994, allowing all South Africans fair access to land and natural resources, has resulted in more than 6 million hectares of previously state-owned land now being more intensively cultivated (GCIS Document, 1999).

This already significant demand on the land, combined with a growing population, and hence growing demand for food, space and other resources, make it essential that the land and its resources are used wisely and sustainably. Plantation forests occur on about 1.5

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These forests support industries important in the economy of South Africa. Although the area of these forests is relatively small (a little more than 1 percent of total land area), the forests place high demands on the environment, (e.g. in terms of water use) compared to both the area occupied, and compared to the natural vegetation which they replace.

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Many international conventions and commissions have been brought about by the global recognition of the need to manage terrestrial ecosystems and resources on a sustainable basis, and

South Africa is party to many of them. The Intergovernmental Forum on Forests of the United Nations Commission for Sustainable Development (UNCSD), for example, recognises the economic benefits and the social and environmental costs of plantation forests as important policy issues. The Convention on Biological Diversity aims to promote the sustainable use of living natural resources world-wide. It also aims to bring about the sharing of the benefits arising from the utilisation of natural resources. The Convention to Combat Desertification is a global initiative aimed at combating the economic, social and political impacts of desertification in those countries experiencing serious drought and/or desertification, particularly in Africa.

Special attention needs to be paid to effective land-use planning and minimising the effects of loss of habitat and of prime agricultural land, as well as pollution and land degradation in its broadest sense. This chapter explains what is causing changes in terrestrial ecosystems, describes the current state of terrestrial systems, and lists what can, and is being done, to reduce the pressures causing degradation.

Recommendations

All of the basic data, as well as various forms of summarised

data, need to be made available to interested parties from scientists to managers and even the general public. Probably the most appropriate method of accomplishing this is via a hierarchical database on the Internet.

Much of the baseline data collected has not been fully analysed. Other aspects of fish community structure such as bio-mass composition, life-history styles and trophic structure should be investigated. A physical water quality impairment category, involving such indicators as temperature, salinity, pH, and turbidity should be explored as well as the potential for creating water quality rating curves for different estuary types in different biogeographic regions.

The geomorphological classification is based only on available data and additional information is required to improve its resolution. In particular, data on the frequency and persistence of mouth opening and on water and barrier crest levels is required. These may enable further subdivision of the categories identified here.

Long-term data sets are also required to establish the range of the natural variation between and within estuaries on a seasonal basis and to monitor key systems. It is also suggested that while a number of types of system have been studied, the lesser-known types of estuary should be examined to ascertain their geomorphological and hydrological functioning. Significant gaps in the database also exist. A number of estuaries, particularly in the Transkei, have not been sampled. These and other missed systems should be sampled to create a full baseline.

Investigations into other estuarine components (e.g. hydrology, sediment biogeochemistry, vegetation, zooplankton, zoobenthos, birds, habitat assessment, and catchment land-use) should also be undertaken to ensure a more complete appraisal of the ecological integrity of the nation's estuarine resource.

Source: State of Environment Report, South Africa



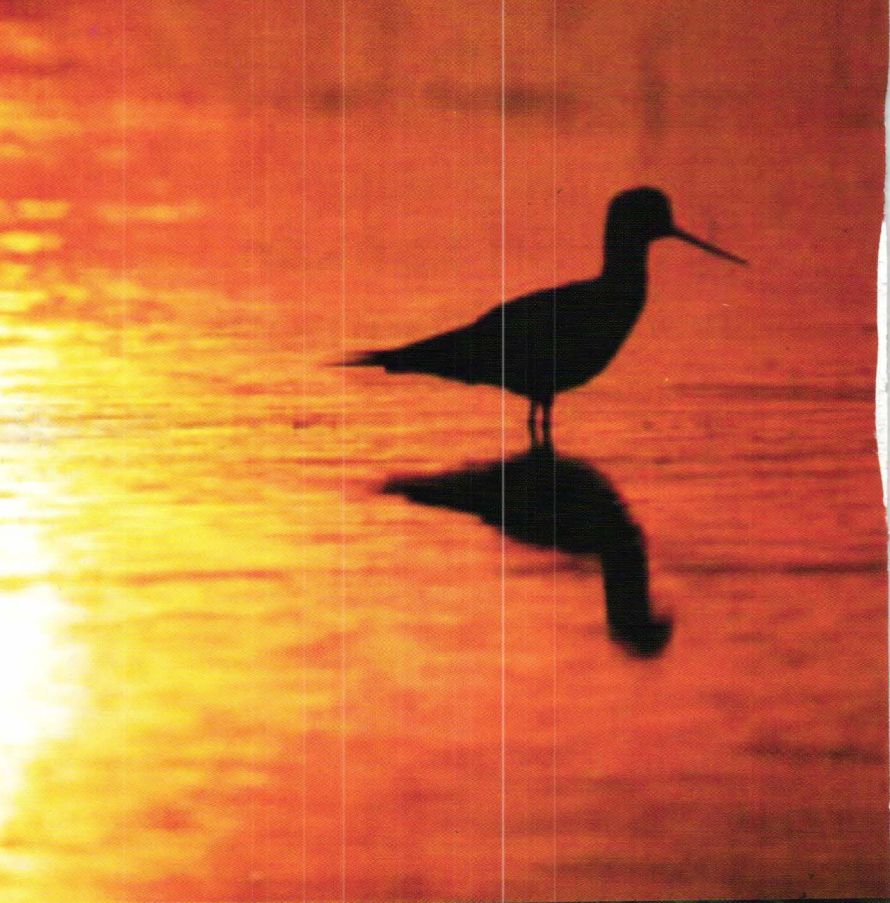
SRI LANKA

Sri Lankan Environment



State of Commonwealth Environment





Sri Lankan environment

Sri Lanka is a tropical island in the Indian Ocean with a history of continuing human occupation for over 25 centuries. The country's total population is around 19 million and with a population density of 280 persons per sq. km is one of the highest in the world. Over 40 per cent of the people are engaged in activities directly dependent on the environment and about 25 per cent people live in urban or semi urban areas. The development efforts of successive governments during the last five decades have led to an increase in the standard of living of its people.

The high population density and sustained efforts to improve living standards have created tremendous pressure on the natural environment of the country. The challenge is to set the right balance between development and the environment, to ensure sustainable progress.

Sri Lanka faces many environmental problems, yet these issues have become increasingly significant from an ecological as well as from a socio-economic stand point. These issues necessitate urgent corrective action, which involve policy interventions, effective management including inter-agency co-ordination, enforcement of laws and substantive investment in implementing mitigatory measures.

Coastal zone management in Sri Lanka

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habitats and resource use conflicts. A realisation of the conflicts and challenges associated with the management of coastal resources in the late 1970s led to the establishment of the Coast Conservation Department (CCD) within the Ministry of Fisheries and the enactment of the 1981 Coast Conservation Act.

In 1986, the CCD began a programme focused on the management of four key issues in the narrowly defined coastal strip: shorefront development, coastal erosion, habitat loss and the decline of recreational and cultural sites. The first

outcome was a regulatory programme designed to reduce coastal erosion through a coastal permit applications system (primarily) for house construction and sand mining), and extensive programme of public education and the construction of some specific coastal protection works.

The second outcome was the development of provincial-level Coastal Zone Management (CZM) Implementation Plans and, in 1995, a series of local-level Special Area Management Plans. Local communities were encouraged to become actively involved in the formulation and implementation of the coastal zone management programme and this bottom-up approach enabled the local community to be "fully aware of and integrated into the planning effort so that it is truly participatory."

The strategic Coastal 2000 Plan recommended a second-generation coastal resources management programme with a "twin-track" approach, in which plans are implemented simultaneously at both the national and local levels. One of the initiatives of Coastal 2000 was the Special Area Management (SAM) Plan; in the early 1990s, two locations were chosen for the development of SAM Plans: Hikkaduwa, a small town on the west coast known for its coastal tourism and marine sanctuary; and Rekawa Lagoon, important for its local fisheries, mangroves, beaches and agriculture.

In 1992, CCD staff and representatives from the Coastal

Resources Management Programme (CRMP) began the process of SAM planning at both locations. Government officials in selected agencies at the national level were contacted, and their interest and support was solicited. At the same time, CCD and CRMP staff began to work with community organisations to identify appropriate groups to be consulted in identifying community perceptions of resource management problems and priorities.

Over the next three years, government officials, community groups and interest group representatives identified priority resource management issues and technical questions. Special Area Co-ordinating Committees, comprising both community representatives and government officials, were established and technical studies were commissioned, including environmental profiles for each Plan area. Resources management issues and strategies were identified and compiled. Their respective co-ordinating committees adopted the SAM Plans for Hikkaduwa and Rekawa Lagoon in 1996.

The SAM planning process at Hikkaduwa facilitated the effective management of the Hikkaduwa Marine Sanctuary, heightened awareness amongst tourist and residents of the need to protect and manage the coastal environment, initiated a waste management strategy and encouraged a glass-bottom boat owner association. In management of Rekawa Lagoon, habitat, fishery and livelihood issues have taken highest priority.

In late 1996, the SAM planning and management processes were evaluated to determine the degree to which coastal management efforts integrated multiple agencies and programmes, levels of government and technical analysis. The evaluation indicated that as the two plans were developed by multidisciplinary teams working with community groups and national, provincial and local government officials, overall integration was excellent.

The plans are based on regulatory activities, coastal development projects, research, monitoring and organisational efforts undertaken by both government agencies and community groups. Co-ordinating committees at both sites are working to maintain a comprehensive approach to improving resources conditions.

Government agencies serve as catalysts or facilitators to help organise communities for resource management. Government provides technical support, and acts as mediators to help balance competing demands in resource management and as partners of communities engaging in co-management with community groups.

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SAM plans are a bottom-up strategy for managing coastal resources that complements the existing top-down regulatory approach in Sri Lanka. They allow for intensive, comprehensive management of coastal resources in a well defined geographic setting (as contrasted with a use-by-use regulation-by-permit approach). Participation by

community residents or stakeholders in planning and management is central to the SAM concept.

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Sri Lanka and its bio-diversity

Due to its location and topography, Sri Lanka, is one of the smallest but biologically most diverse countries in Asia. Consequently, it is recognised as a bio-diversity hotspot of global importance. Among the terrestrial ecosystems are forests varying from wet evergreen forests to dry thorn forests, grasslands, wetlands and freshwater bodies and a complex network of rivers. These together with the coastal and marine ecosystems such as sea grass beds, coral reefs, estuaries and lagoons, and associated mangrove swamps constitute the diverse and complex network of ecosystems in the country. In addition, there are numerous man-made ecosystems related to agriculture and irrigation, which have a direct bearing on the conservation, sustenance and survival of biological resources.

Sri Lanka's high population density, high level of poverty, and wide spread dependence on subsistence agriculture are exerting considerable pressure on the bio-diversity of the country. Extensive land degradation and deforestation and the unregulated exploitation of natural resources (e.g. Mining for coral lime, sand and gemstones) are some of Sri Lanka's most pressing problems.

In response, the national Conservation Strategy, the National Environmental Action Plan, the Forestry Sector Master Plan, the National Coastal Zone Management Plan and Coastal 2000 are some of the policy instruments that are addressing bio-diversity conservation. There are also many Government Institutions whose responsibility is to translate these policy initiatives into action.

However, despite the legal, policy and institutional support for its conservation, the country's bio-diversity is continuing to diminish. The growth and movement of population, the opening of economic markets, and new trends in industrial development are expected to have a growing adverse impact on bio-diversity unless some systematic and stringent corrective measures are taken.

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Sri Lanka ratified the Convention on Bio-diversity in 1994 and as a response to article 6 the Convention, the preparation of "Bio-diversity Conservation in Sri Lanka- A Framework for Action" began in early 1996. What this plan proposes is a course of action to ensure that the biological diversity within the country is conserved and used sustainably.

Land degradation due to soil erosion

Land is the most vital and heavily threatened natural resource in Sri Lanka. Degradation of land due to soil erosion is of much concern because of its consequences on agriculture, which is a major contributor to the country's GDP. It is estimated that

about 5-10 mm of topsoil is lost every year. In the hill country, where several large rivers originate and critical watersheds are located, erosion is acute. Several direct and indirect factors cause soil erosion.

- "Chena cultivation" (slash and burn cultivation), practised in about 15 percent of the total land area, is a major cause. Insecure land tenure, with rotation of cultivation by plots and by season, also causes degradation of land because land is exploited to the maximum with minimum conservation measures.
- The study conducted by the Hector Kobbekaduwa Agrarian and Training Institute (HARTI) revealed that poverty has a direct relationship to the extent of soil erosion.
- Another factor influencing erosion is the increasing rate of deforestation mainly by commercial loggers.
- The cultivation of erosive crops such as potatoes, tobacco and vegetables has led to severe erosion particularly in hilly areas.
- Sand and gem mining, construction of roads, housing projects and other infrastructure development activities, have also contributed to soil erosion.

Tea plantations and large- scale development projects such as the Mahaweli Development Programme have led to extensive soil erosion in the hill country. Impacts of soil erosion vary with the type of crop and the geographic location. Critical watersheds where several large rivers originate have been adversely affected.

- The degraded soil in tea and other commercial plantations require the application of large quantities of chemical fertilisers leading to higher costs of production.
- Floods, land slides and siltations of large reservoirs are some of the indirect effects of soil erosion.

Water resources and pollution of inland waters

The ancient hydraulic civilisation in Sri Lanka was founded on harnessing the abundance of water resources. Expanded agricultural sector and growing industrial and urban sectors have steadily increased the demand for water resources on the one hand and negatively affected the quality of water bodies on the other.

There are 103 rivers flowing in a radial pattern from the high watersheds. The longest river, Mahaweli, drains 16 percent of the Island and transports water from the wet zone to the dry zone. Other water bodies include numerous wetlands, major and minor irrigation systems and significant groundwater resources.

The annual renewable freshwater resources amount to 2,341 cubic meters per capita ('Water Resources 1998/ 99' Water Resources Institute 1999) However, recent studies undertaken by the International Water Management Institute (IWMI) reveal that aggregate figures mask the significant spatial and temporal variations in water supply and demand. 79 percent of the water in the wet zone escapes into the sea as against 51 percent from the dry zone (Sri Lanka Water Vision 2020).

Water is mainly used for irrigation, hydropower and domestic purposes and for industry. Irrigation is the single largest water user in the country. Only 14 percent of the rural population has access to piped water compared to 75 percent of the urban population. Non-revenue water in the pipe borne water supply is estimated at 40 percent by the National Water Supply and Drainage Board (NWSDB). This is mainly due to poor maintenance, high connection costs (which leaves the poorer sections of the community dependent on stand posts), leakage and illegal consumption.

The principal source of surface and ground water is rainfall. Water pollution in the country arises from agricultural practices with extensive use of agro-chemicals and fertilisers, urbanisation and industrialisation resulting in the release of untreated industrial effluents, dumping of domestic waste and flow of sewage into waterways.

- The high concentration of population and migration towards urban centres such as the Colombo Metropolitan area and other cities has led to pollution through discharge of waste into waterways.
- About 80 percent of the industries are concentrated in the districts of Colombo and Gampaha. Some of these industries are highly polluting with the use of textile dyeing, bleaching, food processing, leather tanning, metal finishing, agro and mineral products.
- Many industries have no waste treatment facilities.

- Eutrophication or the process of nutrient enrichment of stagnant waters due to accumulation of fertiliser used in upland areas has affected several large inland reservoirs.
- Use of chemical fertilisers resulting in high nitrate contents in drinking water wells, mostly in agricultural areas.
- Water is also polluted through pit latrine soak ways.
- Pollution of inland water affects human health through the spread of water borne diseases and also has adverse impacts on fish, birds, other living organisms and even entire ecosystems.

[Source: Sri Lanka : State of the Environment 2001 and State of Asia Pacific]

Environment change on the rise

By Dharman Wickremaratne

Environmental protection in Sri Lanka is more or less guaranteed by law and there are certain agencies entrusted with the Ministry of Environment, the Department of Wildlife Protection, the Department of Coast Conservation, the Central Environmental Authority and so on. Even local authorities such as Provincial Councils, Municipal Councils and Regional Councils are involved in environmental protection, particularly in the area of waste disposal.

There are several non-governmental organisations (NGOs), in Sri Lanka devoted to the cause environmental protection mainly through awareness creation. Their contribution is commendable. With a high literacy rate (80 percent), that is considered to be the highest in Asia, Sri Lanka reading public is quite extensive. There are many newspapers published in Sri Lanka in English, Sinhala and Tamil (12 dailies and 84 weeklies). In addition to the newspapers there are 22 radio channels and 9 TV channels, both state-controlled and private-owned. All these media patronise large segment of the tile public, while newspapers remain the major source in creating environmental awareness. Only recently the radio and the TV channels have started out in this direction.

The mass media in Sri Lanka plays a role as a channel and means for environmental education. The fact that the media plays a very significant role in providing information on environment was confirmed by a recent Environment Awareness Study, where most people cited different organs of the media as their primary source of environmental education. A majority of the sample population in both urban and rural area cited the print media as the primary source of information on the environment. Television was the next major source of information for the

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As a result in changing world trends in environmental concerns, the subject of environment has recently found its way into education programmes mainly at university level. Environmental topics have also of late been included in teacher training curricula. This augurs well for future trends in environment education in Sri Lanka.

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The media plays different and multiple roles in relation to information and commentary on environment and development. In a developing country, situations as those that exist in Sri Lanka, the media performs many roles.

Until recently environmental education (informally) has been a function of the NGO sector. NGOs have been handling the task of environmental education mainly in the form of awareness creation through publications including the newspapers. Certain NGOs have also conducted seminars, workshops, lectures, photographic exhibitions and other activities. Various donor agencies have

also come to the assistance of these NGOs towards their efforts. Because of the role played by the NGO sector in the sphere of environmental education certain state sector agencies have also got involved in this important task in the recent past by seeking the expertise of the NGOs on certain occasions in conducting education programs.

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In the face of the situations that existed during the past few decades in regard to environment education in Sri Lanka, environmental journalism played the all important role of filling the void of not having properly structured programs of environment education. As stated earlier, at least the basic function of awareness creation in environmental issues owes much to environmental journalism.

There is a growing demand from the public for more and more information on environmental issues. This is an indication that

environmental journalism has had the desired effects over the years. At the last World Congress of Environmental Journalists held in Colombo in October 1998, the Chief Guest at that occasion, Honourable Minister of Tourism and Civil Aviation in Sri Lanka stressed the need for raising the level of environmental journalism and emphasised the importance of balanced and informative reporting.

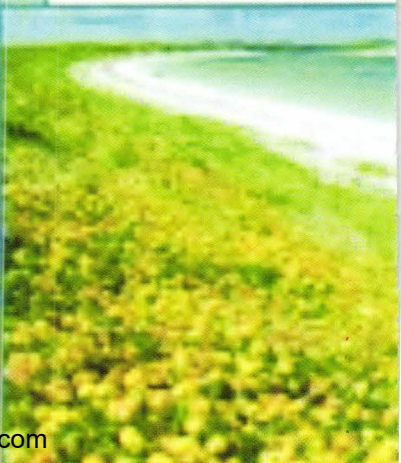
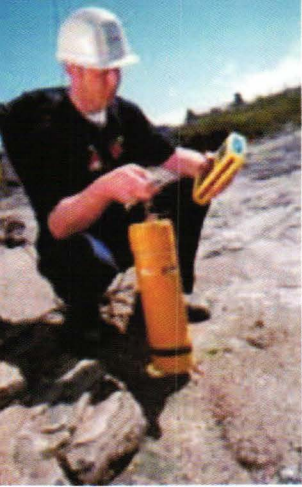
He also underlined the importance of environmental education in connection with which the environmental journalists have a vital role to play. This goes to prove that environmental journalism in Sri Lanka occupies an important position and that it also enjoys government patronage. This augurs well for the future of environmental journalism in Sri Lanka and organisations like the Sri Lanka Environmental Journalists Forum (SLEJF) have an important role to play in promoting vibrant environmental journalism.



UNITED KINGDOM

Climate change negotiation





Climate change negotiation

By Graham Clough

A few weeks ago I met several of the people in Dhaka (at Seminar on Climate Change Negotiation held on July 5, 2001 in Dhaka organised by FEJB, WWFJ and CEJA) at a Reception held by the British High Commissioner. I was struck by the concerns that many of you expressed over environmental issues. I was also struck by the level of commitment to tackle these issues.

We share this commitment in the UK. The dangers of ignoring our duty to treat nature with respect are clear for all to see. It is also clear that there are no solutions to environmental problems except ones based on mutual responsibility.

The British Prime Minister has emphasised on several occasions that he wants environmental issues to occupy a central part of the British Government agenda in the coming years. He has also said that if we are to show leadership on climate change, we must demonstrate this commitment with actions - we must set a standard at home, and show leadership abroad. We must therefore work at the domestic level, within the European Union, and at the wider international level.

At the domestic level, we have already honoured our Rio commitment to bring the UK's greenhouse gas emissions back to 1990 levels by the year 2000. And we expect our emissions to be 23% below the 1990 levels by 2010.

But our climate change programme goes much further than this and sets out a substantial, integrated package of policies and measures. These include measures to increase the use of renewable energy sources, develop more

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Climate Change will affect us all - and we can all be part of the solution. We have a responsibility to take action, but it is also in our interests to do so.

Measures to reduce green house gas emissions can be good for the economy, for business and for our communities.

efficient energy sources, make buildings more energy efficient and cut emissions from the transport sector. We have, for example, set a specific target of increasing to 10% the proportion of electricity produced by renewable sources by 2010.

The UK has also played a major role in the development of European Union policies on climate change and sustainable development. In April 2001 the EU said that:

The European Climate Change Programme, agreed in Gotheburg last month, sets the framework for the EU's approach. The Framework takes a twin track approach with measures to cut greenhouse emissions in the EU, and the development of an emissions trading scheme which could be operational within the EU by 2005.

The UK will continue to work closely with its partners in the European Union in the preparations for the Rio + 10 Summit in Johannesburg next year.

The international level is also of great importance. Britain's new Foreign Secretary, Jack Straw, in his first speech to the House of Commons in his new role said that: On issues such as the environment, drugs and organised crime, the boundaries between foreign and domestic policy have increasingly become blurred. If we are to look after our interests at home, we have to be active and engaged overseas.

Numerous studies have suggested that Bangladesh is one of those countries likely to be most affected by Climate Change. As one of Bangladesh's largest development partners it is therefore vital that we understand as fully as possible the implications of climate change for the development of Bangladesh.

We have recently recruited a Bangladeshi climate change and natural resources expert to help us to ensure that our development programme takes full account of environmental issues. My DFID colleague has prepared a short brief on the

work they are doing which is available from Quamrul Islam Choudhury. DFID welcome comments on their approach. None of us has all the answers, and it is only by working in partnership that we can hope to ensure an appropriate response to the complex issues that we are here to discuss.

Today's seminar is on Climate Change Negotiation. I would therefore like to take the opportunity to emphasize the importance that the UK places in the Kyoto Protocol. The UK remains committed to ratify the Kyoto Protocol and to work for entry into force next year. There is simply no practicable alternative to the Kyoto architecture, which took 10 years to negotiate.

The British Deputy Prime Minister, John Prescott, writes in the Foreword to the UK's Climate Change Programme that:

Climate Change will affect us all - and we can all be part of the solution. We have a responsibility to take action, but it is also in our interests to do so. Measures to reduce green house gas emissions can be good for the economy, for business and for our communities. Wasting less energy, better insulated homes, cleaner engines and a good public transport system all help to reduce emissions and improve our standard of living. We want to make sure that the UK makes the most of these opportunities - making a strong contribution to the global fight against climate change, while improving the quality of life now, and that of future generations.

In short, successful international negotiations to tackle climate change are vital to all our futures. I sincerely hope that the Seminar on Climate Change Negotiation held on July 5, 2001 in Dhaka organised by FEJB, WWFJ and CEJA will contribute to this process.

