



NATIONAL SUSTAINABLE DEVELOPMENT STRATEGY FOR MYANMAR



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FOREWORD

The concept of sustainable development was developed by the Brundtland Commission Report (1987) which defined sustainable development as “ development which meets the needs of the present without compromising the ability of future generation to meet their own needs”.

At the United Nations Conference on Environment and Development (UNCED) held in Rio De Janeiro, Brazil in 1992, governments were urged to pursue the National Sustainable Development Strategy (NSDS). Johannesburg Plan of Implementation (JPOI) adopted in 2002 at the World Summit on Sustainable Development (WSSD) also called upon countries to take immediate steps to make progress in the formulation and elaboration of the NSDS and begin their implementation by 2005. The United Nations Department of Economic and Social Affairs (UN-DESA) lucidly defines National Sustainable Development Strategy as “*a coordinated, participatory and interactive process of thoughts and actions to achieve economic, environmental and social objectives in a balanced and integrated manner at the national and local levels*”.

In Myanmar, the National Commission for Environmental Affairs (NCEA) formulated Myanmar Agenda 21 in 1997 and it was the expression of the political commitments by the government for achieving sustainable development in Myanmar. It is intended to serve as a framework for integrating environmental considerations into future national development plans as well as for sectoral development programmes.

The NSDS is also an important step and guiding document to fully implement in harmony and balance among the three main pillars of environment, economic and social sectors. It has identified the short, medium and long-term goals for sustainable development. NSDS therefore is more comprehensive in incorporating environmental consideration into social and economic development than Agenda 21 to ensure the achievement of Sustainable Development.

I hope the relevant government ministries, departments and local authorities, UN organizations, International and local NGOs will play an active role in the implementation process of this strategy at all levels. Active involvement and participation of all the stakeholders is necessary to promote environmental conservation and management practices in the country. Institutionalization of NSDS in social and economic development by government ministries, organizations are so important that I therefore would like to encourage all stakeholders to take the institutionalization of NSDS into their consideration.

I would like to thank the United Nations Environment Programme, Regional Resource Centre for Asia and the Pacific (UNEP.RRC.AP) in particular for the endless supports and contributions. I also thank to all others who have, encouragement and all others who have contributed to this guiding document and to NCEA for its initiation and active contribution in the formulation of this document.

Brig.General Thein Aung
Chairman of the National Commission for Environmental Affairs and Minister for Forestry

FOREWORD

The global community is confronted with many challenges including poverty, deforestation and land degradation, melting glaciers, sea level rise, water and food shortage, and an increase in frequency and severity of extreme weather events. The climate change is the defining issue of our era, and we need transformative actions to reverse the trends of unsustainable development.

The National Sustainable Development Strategy (NSDS) for Myanmar has been prepared to provide a strategic long-term framework for sustainable development. The National Commission for Environmental Affairs (NCEA) has taken a lead in developing the NSDS in consultation with concerned Line Ministries and relevant organizations. The Myanmar NSDS is formulated to meet its global commitment made at the Johannesburg Plan of Implementation in 2002. Following the request of the government, UNEP has provided assistance in preparation of the NSDS.

The vision for Myanmar NSDS is set as ‘wellbeing and happiness for Myanmar people’ with 3 overarching goals: i) sustainable management of natural resources, ii) integrated economic development, and iii) sustainable social development. A total of 26 areas have been identified to achieve the goals. Ecosystem management has been given top priority to ensure the sustainability of the ecosystem services. Myanmar will focus on sustainable production and consumption, energy efficiency, and forest based eco-tourism as part of its integrated economic development. One of the major objectives of the Sustainable social development is to create a knowledge based society. A total of 129 indicators have been identified to monitor the progress on economic, social and environmental goals and objectives.

The Myanmar NSDS proposes the preventive measures, besides traditional reactive policies, to address the emerging environmental issues, man-made disasters and the climate change. The establishment of the proposed National Council for Sustainable Development will certainly serve as a vehicle towards mainstreaming sustainable development objectives into national and sectoral policies and strategies. The Myanmar NSDS intends to open up new opportunities for the interdisciplinary approaches, and an avenue for the green economic policy, green investment and green jobs.

Young-Woo Park,
Regional Director
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MESSAGE

Message from Achim Steiner, United Nations Under-Secretary-General and Executive Director, United Nations Environment Programme

The World Summit on Sustainable Development (WSSD) that was held in Johannesburg in 2002, has urged every nation to take immediate steps to formulate and elaborate national strategies for sustainable development and begin to implement it by 2005. Based on this treaty and Myanmar commitment to Earth Summit in 1992, Myanmar was one of the first countries that has formulated Agenda 21 and reported to CSD after WSSD decisions. In 2005, Myanmar requested UNEP to support development of the National Sustainable Development Strategy (NSDS), which is mainstreaming environmental concerns into sectoral development and takes a stock of the recent country developments.

Myanmar is the largest mainland country in Southeast Asia; where its rich culture and traditions, long history of environmental awareness, and also policies and planning at community and national level; have created immense benefit for the country, while in the other hand it increases the vulnerability in the alternation of the state of the world. In this challenging global world transition period, which is being affected by emerging environmental issues, climate change and financial crises; the country has developed a very comprehensive document in a participatory process that is looking ahead and suggests some practical arrangements for sustainable pathways.

Myanmar's vision to sustainable strategy in particular is to conserve natural resources and reduce the susceptibility of poor people to the world crises. The fundamental objectives of Myanmar's sustainable development are to establish harmonious integration of a sound and viable economy, responsible governance, social cohesion and harmony and also ecological integrity; to ensure that development is a life enhancing process, which centred to the human development for the present and future generations.

This document disclosed the opportunity of the creation of green technology and green policy or in other words the 'green deal', which necessary for the development of sustainable life of Myanmar. This document will also be a driving force for innovation, development of new business and industries, and employment opportunities across the country. Reduction in the number of poverty is expected to occur through the implementation of the 'green deal' strategy.

However, the success of the long term National Sustainable Development Strategy implementation is depend on the joint efforts from the people of Myanmar, which has to be supported and regulated by the government. Furthermore, insurance of the ownership and responsibility of different Ministries in regulating the country's advance development could also assist the achievement of this process. This document sets up the Goals and objectives of Myanmar to be followed in near future by development of the action plan and clear set of indicators, to ensure that the process of consultations and regular monitoring is being carried on throughout the implementation of the strategy.

The strategies and action plans recommended in this report are expected to be useful for current and future development, which runs by the policy maker or other decision makers in the national level. UNEP gratefully acknowledges the contribution from the government, non-government organizations, private sectors, and other regional and international groups in the preparation of this document.

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ACRONYMS

AAC	Annual Allowable Cut
AFTA	ASEAN Free Trade Area
ALGAS	Asian Least Cost Greenhouse Gas Abatement Strategy
AIDS	Acquired Immune Deficiency Syndrome
ASEAN	Association of Southeast Asian Nations
BANCA	Biodiversity and Nature Conservation Association
BCG	Bacille Calmette-Guerin
BOBLME	Bay of Bengal Large Marine Ecosystem
CBD	Convention on Biological Diversity
CEPT	Common Effective Preferential Tariff
CITES	Convention on International Trade in Endangered Species of both Flora and Fauna
CLC	Community Learning Center
CPI	Consumer Price Index
DOH	Department of Health
DOT	Directly Observed Treatment
EFA	Education for All
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EM	Effective Microorganisms
ESD	Environmental Sanitation Division
EXCEL	Extended and Continuous Education and Learning
FAO	Food and Agriculture Organization
FCCC	Framework Convention on Climate Change
FD	Forest Department
FREDA	Forest Resource Environment Development and Conservation Association
FRHS	Fertility and Reproductive Health Survey
GDP	Gross Domestic Product
GMOs	Genetically Modified Organisms
GNP	Gross National Product
GSP	Generalized System of Preference
HIMS	Healthy Management Information System
ICIMOD	International Center for Integrated Mountain Development
ICT	Information and Communication Technology
IPCC	Intergovernmental Panel on Climate Change
IPM	Integrated Pest Management
ISO	International Standard Organization
ITTA	International Tropical Timber Agreement
IUCN	World Conservation Union
JPOI	Johannesburg Plan of Implementation
KBAS	Key Biodiversity Areas
KTOE	Kilo-Ton Oil Equivalence
LB	Live Birth
LPG	Liquefied Petroleum Gas
MCDC	Mandalay City Development Committee
MDGs	Millennium Development Goals
MMDGs	Myanmar Millennium Development Goals
MERs	Managed Elephant Ranges

MES	Myanmar Engineering Society
MICS	Multiple Indicator Cluster Survey
MIDC	Myanmar Industrial Development Committee
MMD	Myanmar Millennium Development
MNCWA	Myanmar National Committee for Women's Affairs
MNPED	Ministry of National Planning and Economic Development
MOF	Ministry of Forestry
MOHT	Ministry of Hotel and Tourism
MOT	Ministry of Transport
MRS	Monitoring, Research and Surveillance
MWAF	Myanmar Women Affairs Federation
NCEA	National Commission for Environmental Affairs
NDC	Nay Pyi Taw Development Committee
NFE	Non-Formal Education
NGO	Non-governmental Organization
NSDS	National Sustainable Development Strategy
NTP	National Tuberculosis Program
NWCD	Nature and Wildlife Conservation Division
NWFP	Non-Wood Forest Product
OECD	Organization for Economic Cooperation and Development
OPEC	Organization of Petroleum Exporting Countries
POPs	Persistent Organic Pollutants
PPP	Purchasing Power Parity
R&D	Research and Development
RCA	Revealed Comparative Advantage
RHC	Rural Health Centre
RIL	Reduced Impact Logging
SALT	Sloping Agriculture Land-use Technology
SD	Sustainable Development
SEEs	State-owned Economic Enterprises
SMEs	Small and Medium Enterprises
SMIs	Small and Medium Sized Industries
STD	Sexually Transmitted Disease
TB	Tuberculosis
UNCED	United Nations Conference on Environment and Development
UN-DESA	United Nations Department of Economic and Social Affairs
UNEP	United Nations Environmental Program
UNFCCC	United Nations Framework on Convention on Climate Change
UNICEF	United Nations International Children Emergency Fund
WCED	World Conference on Environment and Development
WHO	World health Organization
WSSD	World Summit on Sustainable Development
YCDC	Yangon City Development Committee

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EXECUTIVE SUMMARY

The Union of Myanmar is geographically located in Southeast Asia, having a total area of 677,000 km². Myanmar is rich in natural resources particularly forests, land and water resources in addition to biodiversity. Achieving sustainable development of these resources is vital to the country. The 2002 Johannesburg Plan of Implementation (JPOI) called upon countries to take immediate steps to make progress in the formulation and elaboration of the National Sustainable Development Strategy (NSDS), and begin their implementation by 2005. NSDS is an important mechanism for countries to achieve sustainable development. Accordingly, Myanmar needed to formulate its national sustainable development strategy. Myanmar has already formulated its Myanmar Agenda 21 to fulfill its commitments to the 1992 historic Earth Summit. Myanmar's NSDS covers the three pillars, namely environment, economic and social aspects of the country. Like many other countries, Myanmar is affected by the impacts of globalization.

Myanmar's NSDS vision is "Wellbeing and Happiness for Myanmar People". Three goals identified are as follows:

Goal1: Sustainable Management of Natural Resources;

Goal 2: Integrated Economic Development; and
Goal 3: Sustainable Social Development.

Sustainable management of natural resources in Myanmar, from environmental perspective, comprises 11 areas, namely:

- (i) Sustainable forest resources management;
- (ii) Biodiversity conservation;
- (iii) Sustainable freshwater resources management;
- (iv) Environmental quality management and enhancement;
- (v) Sustainable management of land resources;

- (vi) Sustainable management of coastal, marine and island ecosystems;
- (vii) Sustainable management of eco-tourism;
- (viii) Sustainable management for mineral resources utilization;
- (ix) Sustainable management of agriculture, livestock and fisheries ;
- (x) Sustainable energy production and consumption; and
- (xi) Sustainable industrial, transport and communication development.

Lead Institution and Collaborating Institutions are identified for each area which has objective(s) with activities to be implemented to achieve the set objective(s) within the short-, medium-, and long-terms.

Integrated economic development deals with 9 themes, namely

- (i) Reasonable macroeconomic performance;
- (ii) Sustainable agricultural development;
- (iii) Sustainable livestock and fisheries development;
- (iv) Sustainable forest development;
- (v) Sustainable energy development;
- (vi) Sustainable mining sector development;
- (vii) Sustainable industrial development;
- (viii) Sustainable transportation and communication development; and
- (ix) Sustainable tourism development.

Lead Institutions and Collaborating Institutions are identified for each theme which has objective(s) with activities to be implemented to achieve the set objectives and performance indicators to monitor the economic development.

Sustainable social development includes 6 areas, namely

- (i) Create a knowledge-based society;
- (ii) Vulnerable group: women;
- (iii) Uplift of health;
- (iv) Culture
- (v) Social development and tourism, and
- (vi) Strengthening development of border areas and national races.

Lead Institution and Collaborating Institutions are also identified for each area which has objective(s) with activities to be implemented the set objective(s). The indicators measure the performance and the recommendations for activities to be carried out if the required resources are available.

A National Council for Sustainable Development (NCSD) is recommended to administer the implementation of Myanmar NSDS. The proposed NCSD would be led by the Minister of an oversight agency. The NCSD members would be either the Ministers/Deputy Ministers or Director-Generals of the line ministries. It is important that the Secretariat of NCSD is technically competent and proactive. Adequate and sustainable financial support is a must.

A course of actions is proposed to support implementation arrangements for NSDS in

Myanmar with a view to supporting the attainment of the NSDS vision and the strategic objectives. Actions proposed are:

- (i) Policy Framework;
- (ii) Advocacy, Awareness Raising and Education;
- (iii) Capacity-Building;
- (iv) Adequate Financing and Technology; and
- (v) Monitoring and Evaluation.

Respective objectives are:

- (i) To create enabling conditions for the implementation of NSDS;
- (ii) To promote the concept of Sustainable Development among national, local organizations, and communities;
- (iii) To develop capacities, duly supported by relevant national and international organizations, to implement the proposed activities;
- (iv) To support the creation of enabling conditions for promoting solutions to implement the activities relating to sustainable development and
- (v) To monitor and evaluate the progress achieved relating to implementation of NSDS and its goals.



PART 1 | INTRODUCTION

1.1 THE LAND AND ITS PEOPLE

Myanmar is the largest country on mainland Southeast Asia. It has a total land area of 677,000 square kilometers, and shares borders with five countries for about 6,151 kilometers sharing 274 kilometers with Bangladesh on the West, 1,339 kilometers with India on the North-West, 2,205 kilometers with China on the North-East, 225 kilometers with Laos on the East and 2108 kilometers with Thailand on the South-East. It has a total coastline of 2,229 kilometers.

Myanmar lies on the crossroads of two of the world's great civilization and densely populated countries, China and India. The population of Myanmar in the fiscal year 2005/06 is estimated at 55.4 million of which 49.7 percent is male and 50.3 percent is female. Myanmar is

a union of many nationalities speaking over one hundred languages and dialects, but living in close harmony. There is freedom of worship in the country but Buddhism is the dominant religion and is embraced by more than 80% of the population Christianity, Islam, or Hinduism is worshipped by the rest of the population with animism followed by a small number.

Myanmar has three parallel chains of forest-clad mountain ranges that run north to south from the eastern extremity of the Himalayan mountain range, the Western Yoma or Rakhine Yoma, the Bago Yoma and the Shan Plateau. These three mountain chains divide the country into three river systems, the Ayeyarwady, the most important river in the country, the Sittaung and the Thanlwin.

1.2 IMPACT OF GLOBALIZATION

In today's age of science and technology everything is connected and intertwined. The world which in Columbus's days when people had to sail the seven seas for so many months

has become but a few hours journey. We have witnessed the evolution of business from the traditional way of trade to e-commerce. In other words, time and distance have shrunk

and the world has become but a global village. Globalization has brought about many economic benefits which have led to the material wellbeing of hundreds of millions of people uplifting the quality of life such as increasing literacy and life expectancy.

But there are those left out in the evolution, as if they do not belong to this ever-changing world around them. They may be forgotten in good times, but in times of crisis they are the first to bear the consequences. The power and effects of the crises, whether economic crisis or natural disasters strike the poor with intensity and disproportionately.

1.3 SUSTAINABLE DEVELOPMENT

Sustainable development is defined by the World Commission on Environment and Development (WCED) in 1987 as the "development that meets the needs of the present without compromising the ability of the future generations to meet their own needs". The essence of sustainable development in Myanmar lies in the harmonious integration of a sound and viable economy, responsible governance, social cohesion and harmony and ecological integrity to ensure that development is a life-enhancing process. The ultimate aim of development is human centered development for the present and for future generations.

Even before the Millennium Summit, the United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro in June 1992 expressed new thinking about sustainable development of human society reflecting the political commitments at the highest level on the need for extensive cooperation in relation to environment and development. Agenda 21 calls for all nations to develop and put into effect their own national

Aware of this fact, at the United Nations Millennium Summit in September 2000, the Member States of the UN adopted a programme of Measures of the Millennium Declaration in response to the challenges facing the international community at the start of the 21st century.

The member countries are implementing activities to achieve the goals set in the declaration and Myanmar is of no exception. It is striving its best from all perspectives to achieve sustainable development, to alleviate poverty, to shield, support and bring the poor back on their feet.

strategies, plans and policies for sustainable development.

Article 162 of World Summit on Sustainable Development (WSSD), Johannesburg, 2002 also urged that "States should take immediate steps to make progress in the formulation and elaboration of national strategies for sustainable development and begin their implementation by 2005". To this end, as appropriate, strategies should be supported through international cooperation, taking into account the special needs of developing countries, in particular the least developed countries. Such strategies, which were applicable, could be formulated as poverty reduction strategies that integrate economic, social and environmental aspects of sustainable development, and should be pursued in accordance with each country's national priorities.

Thus, there is a necessity to formulate national strategies for sustainable development for each country along with the institutional context within which these strategies have been formulated.

1.4 ENVIRONMENTAL, ECONOMIC AND SOCIAL ASPECTS TO ALLEVIATE POVERTY

The formulation of Myanmar Agenda 21 is part of the country's effort to fulfill its commitments to the historic Earth Summit in 1992. It is firmly rooted in national realities and aspiration and is

grounded in a shared vision of Myanmar society. Despite some achievements, the implementation of this Agenda has been less than satisfactory and much remains to be done.

It is confronted with difficulties ranging from lack of public and government awareness to lack of funding and capacity and the changing situation within the last ten years. A mechanism thus, is essential to renew and reinvigorate Myanmar Agenda 21 and National Sustainable Development Strategy (NSDS) could be the mechanism to translate the country's goal and

Environment

Every country should determine the best approach in NSDS preparations and implementation on the basis of the prevailing political, historical, cultural, and ecological situation (NORAD & UNEP 2006). The key environmental issues and causes in Myanmar along with other ASEAN countries have been well documented. Deforestation, loss of biodiversity, urban air pollution, soil erosion, water contamination and water-borne diseases are shared issues. And the key causes are land clearance, excessive mineral extraction, vehicular congestion and emissions, deficiencies in urban infrastructure - unmanaged industrial and municipal effluents (L.D Nguyen 2004). The objective of Myanmar's environmental policy issued in 1994 is "*... the integration of environmental considerations into the development process to enhance the*

Economics

Regarding economic development, traditionally, development has meant the capacity of a nation's economy to generate an annual increase in its Gross Domestic Product (GDP) or Gross National Product (GNP). In this strict term, development was identical to mere economic growth. A common alternative economic index of development at that time was rate of growth of per capita GDP to take into account the ability of a nation to expand its output at a rate faster than the growth rate of its population.

However, people have come to realize that economic growth met targets of a nation but the levels of the masses of people remained unchanged in the poverty trap. Thus economic

aspiration of sustainable development into concrete policies and actions and meeting their targets, which will uplift the quality of life of Myanmar citizens; in other words, it will alleviate poverty. The three pillars, environment, economics and social aspects are identified in order to alleviate poverty.

quality of life of all its citizens. ...It is the responsibility of the State and every citizen to preserve its natural resources in the interests of present and future generations. Environmental protection should always be the primary objective in seeking development."

Environmental sustainability refers to the maintenance of the ecosystem and the natural resource base. Environmental degradation signifies three forms: depletion of resources; pollution, or overuse of the waste absorbing capacity of the environment; and reduction in biodiversity - a loss of some types of resources.

Strategies are drawn with this objective in mind. However compared to *indicators* of economic and social aspects, environmental and sustainable indicators are relatively new phenomena.

development came to consider social issues, and was redefined in terms of the reduction or elimination of poverty, inequality, and unemployment within the context of a growing economy. According to this definition, economic growth could not cover the essence of development which contained core values such as sustenance or the ability to meet basic needs, self-esteem or to be a person, and freedom from servitude or to be able to choose.

In accordance with the preceding definition of development, nations and peoples more or less have become developed. However, the natural environment in particular deteriorated, and human society suffered the adverse affects of

atmospheric degradation. Thus the modern view on development shifted from one-off event to sustainability over time. A possible basic measure to give a better fit economic with environmental and social realities is green GDP or green accounting which seeks to modify national income statistics to take account of the environment.

From the economic point of view, an economically sustainable system must be able to produce goods and services on a continuing

basis, to maintain managerial levels of government and external debt, and to avoid extreme sectoral imbalances that damage agricultural or industrial production. With all these aspects, Myanmar must strive to achieve economic development all the time while maintaining and enhancing natural capital. Myanmar's endeavors and pledges to attain sustainable economic development adjusting social and environmental matters were addressed in the drawing of the strategies.

Social

It has been mentioned in Myanmar Agenda 21 that one of the key objectives of sustainable development is to achieve a balance between satisfying human needs and aspirations, and the sustainable use of resources and protection of the environment to ensure the quality of life for the present and future generations.

A blueprint agreed to by all the world's countries and world's leading development institution is the Millennium Development Goals (MDGs) which range from halving extreme poverty to halting the spread of HIV/AIDS and providing better educated children, greater survival prospects for mothers

and infants and healthier environment, all to be achieved by the target of 2015. Prospects for achieving these goals have been explored, and best practices that have contributed towards reducing poverty, achieving universal primary education improving child and maternal health, combating HIV/AIDS malaria, tuberculosis, and promoting environmental sustainability have been examined. The outcome of these activities revealed that much work remains to be done to achieve the set targets and thus, the strategies presented for sustainable social development are more or less in line with these goals.

1.5 MYANMAR NSDS VISION

The term well-being generally refers to a person being well, healthy and contented with life. According to WHO's definition, health encompasses physical, mental and social well-being. One of the most enduring pursuits throughout the entire history of humanity has been the search for well-being, happiness and the good life. It takes only a minor excursion into human history to realize that the answers to this question have been extraordinarily diverse. The quality of life and the nation are usually measured by the income of the citizens, the amount of income and the number of houses and properties, etc. Everybody is familiar with the term GDP which measures the success of producing and moving products. However, people across the world have come to accept that the quality of life is more than the amount of goods people produce or consume.

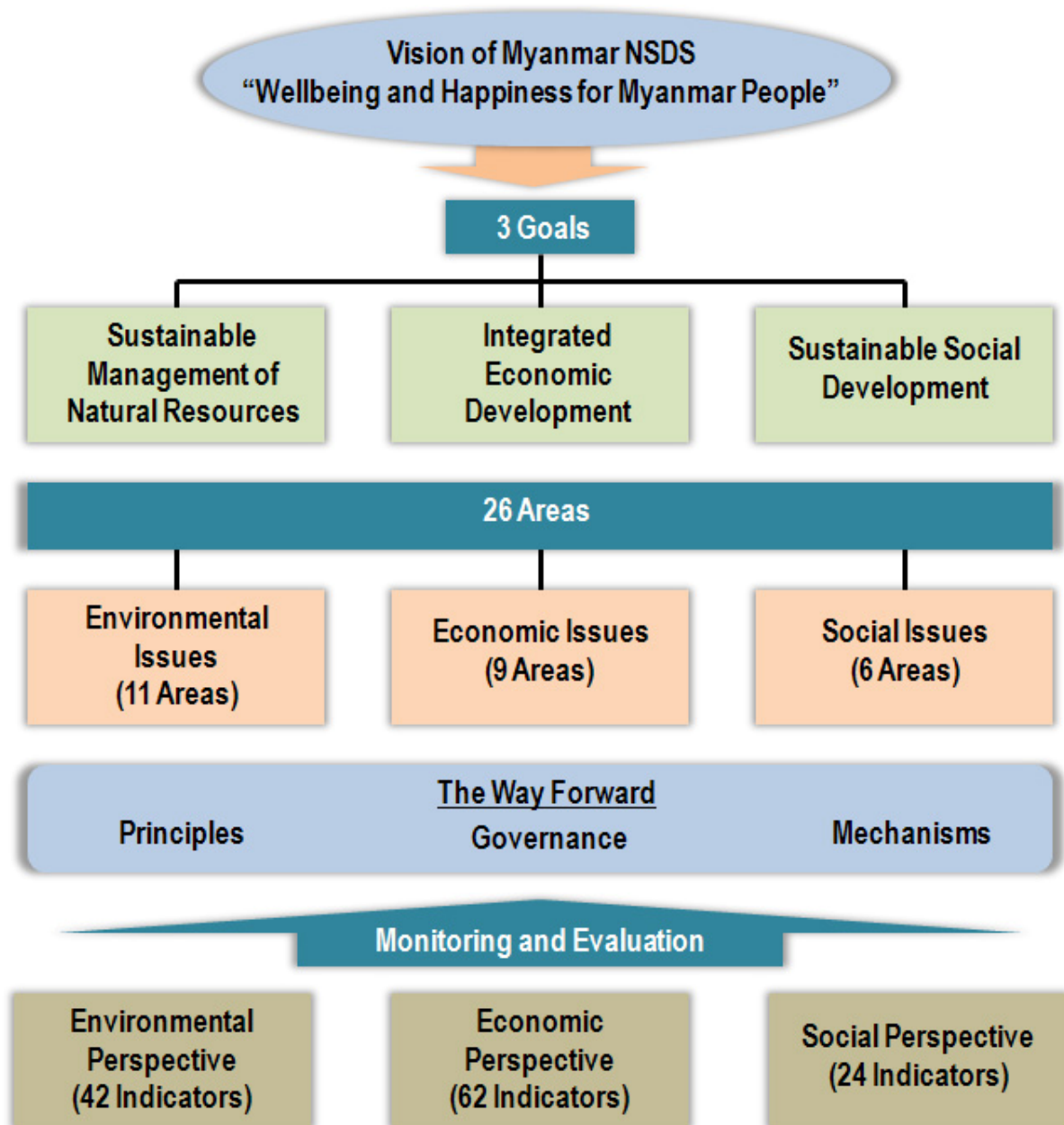
A new term to measure quality of life namely Gross National Happiness (GNH) was put forward by His Majesty the King of Bhutan, Singye Wangchuk. It seeks to evaluate society on the merits of how well people treat each other, and the frequencies of smiles.

The four pillars of GNH are

- (1) Sustainable and equitable socio-economic development
- (2) Conservation of the environment
- (3) Preservation and promotion of culture, and
- (4) Promotion of good governance.

These four pillars are very much in line with the three pillars to alleviate poverty, in other words, with NSDS, which are as mentioned above, environmental, economic and social aspects. With these factors in mind, Myanmar has created the vision for NSDS as "Wellbeing and Happiness for Myanmar people".

Model of Myanmar NSDS





PART 2 | PROCESS OF NSDS DEVELOPMENT

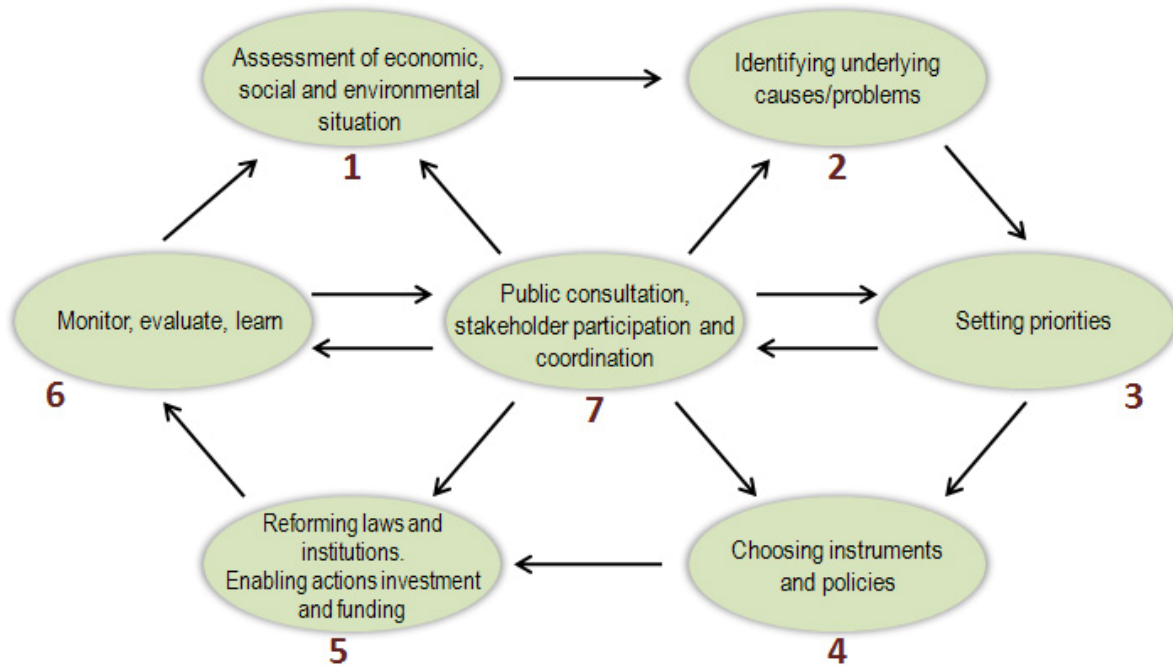
The United Nations Department of Economic and Social Affairs (UN-DESA) lucidly defines National Sustainable Development Strategy as *“a coordinated, participatory and interactive process of thoughts and actions to achieve economic, environmental and social objectives in a balanced and integrated manner at the national and local levels”*. The Development Assistance Committee of Organization for Economic Cooperation and Development (OECD) has also defined NSDS as *“a coordinated set of participatory and continuously improving process of analysis, debate, capacity-strengthening, planning and investment, which*

integrates the economic, social and environmental objectives of society and seeks trade-offs where such integration is not possible”. Thus, NSDS refers to a process which involves situation analysis, formulation of policies and action plans, implementation, monitoring and regular review. It is a cyclical, interactive and adaptive process of planning, participation and actions in which the emphasis is on managing progress towards sustainable goals. Figure 1 in page 7, presents the process of formulation of a typical NSDS suggested by UN-DESA.

Several Advantages of National Sustainable Development Strategy

- Facilitating decision-making and improving the effectiveness of public policy so that economic, ecological and social issues can be analyzed in a comprehensive and integrated way;
- Enhancing mobilization of resources by facilitating the mobilization of a nation's human, financial and material resources in support of sustainability as well as international support;
- More efficient allocation of resources according to priority and needs declared for the country;
- Resolving conflicts by facilitating a multi-stakeholder dialogue; and
- Building human and institutional capacity to sustain transformation of processes and institutions towards sustainability.

Figure 1: Formulating Strategy



Source: UNDESA 2002

NSDS generally paves the way toward achieving sustainable development for a nation. As development of NSDS is the concern of all citizens of a nation, participation of all relevant stakeholders through consultation is crucial especially during the course of developing the strategy.

The essence of NSDS is to employ the natural resources for present needs without hampering the benefits of the upcoming generations. Governments were therefore urged to pursue NSDS by UNCED held in Rio, Brazil in 1992. The pledge to develop NSDS by governments was repeatedly reaffirmed at the summits and in UN declarations (Rio+5 1997, UN Millennium Declaration 2000, and the Johannesburg Plan of Implementation 2002 - JPOI).

Acknowledging the importance of developing strategy for sustainable development at the national level, Myanmar, with the assistance of UNEP.RRC.AP, had planned to develop a strategy. A Memorandum of Understanding (MOU) for the development of NSDS for Myanmar was signed between NCEA and UNEP.RRC.AP in April, 2007.

The first inception workshop was held on 28-29 June, 2007 and three national consultants for

the aspects of the environment, sociology and economy were appointed on 10 July, 2007 in Yangon. The consultants prepared the draft reports on the three aspects which were distributed to relevant stakeholders including government organizations and non-government organizations (NGOs).

The first consultation meeting was held on 26-27 September, 2007 in Nay Pyi Taw to review the first draft reports, and was attended by the various stakeholders. Participants from different professions actively took part to contribute to further improve the report so that it will reflect the up-dated situations. The consequent advice and approvals strongly supported the revision of the first draft report.

As scheduled, the second consultation meeting was held on 13-14 November, 2007, in Nay Pyi Taw to review and, revised again the second draft reports. Expert group was formed and the draft was submitted to it for review. After the reviewing process, the National Experts Review Meeting was held on 6-7 December 2007 in Yangon. Comments from the experts were received and the report was finalized based on the comments.

3.1 GOAL 1: SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES

Myanmar Agenda 21 formulated in 1997 is an indicator of the political commitment in incorporating environment and development. The specific aim of Myanmar Agenda 21 is to facilitate the incorporation of environmental and sustainable development policy considerations into the decision-making and policy formulation processes of the government in the economic and social sectors. In broad view, Myanmar Agenda 21 covers the three broad dimensions of sustainable development - the social, economic and environmental dimensions.

The Millennium Declaration shaped eight Millennium Development Goals (MDGs), which provided countries around the world with a framework for development and time-bound targets by which progress can be measured. The MDGs contained solemn commitments of all countries to promote sustainable development. The first Myanmar Millennium Development Goals Report was published in April 2005 and the second was published in November 2006. The Myanmar Millennium Development Goals were based within the

context of the National Development Plans which reflect many aspects of MDGs (MNPED, 2006a). Thus this National Sustainable Development Strategy of Myanmar is mainly based on Myanmar Agenda 21 and Myanmar Millennium Development Goals (MDGs).

The sustainable management of natural resources in Myanmar, from the environmental perspective, comprises eleven areas together with strategies, namely: (1) sustainable forest resources management; (2) biodiversity conservation; (3) sustainable freshwater resources management; (4) environmental quality management and enhancement; (5) integrated management of land resources; (6) sustainable management of coastal, marine and island ecosystems; (7) sustainable tourism development; (8) sustainable development and utilization of mineral resources; (9) sustainable agriculture, livestock and fisheries development; (10) sustainable energy production and consumption; and (11) sustainable industrial, transport and communication development.

3.1.1 Sustainable Forest Resources Management (Environmental Perspective)

Lead Institution

Ministry of Forestry

Collaborating Institutions

Ministry of Agriculture and Irrigation, NCEA and related Departments, Agencies and NGOs.

Overview

The Forest Policy (FD 1995a) has identified six imperatives (MOF, 2001a), namely, protection (of soil, water, wildlife, biodiversity and environment); sustainability (of forest resources to ensure perpetual supply of both tangible and intangible benefits accrued from the forests for the present and future generations); basic needs (of the people for fuel, shelter, food and recreation); efficiency (to harness in the socio-environmentally friendly manner, the full economic potential of the forest resources); participation (of the people in the conservation and utilization of the forests); and public awareness (about the vital role of the forests in the well-being and socio-economic development of the nation). The Forest Law, 1992, highlights forest protection, environmental and biodiversity conservation, security of permanent forest estates and protected areas system; opportunities for the promotion of private sector involvement in reforestation and timber trade; and community participatory approach in managing forest resources, particularly to satisfy the basic needs of the rural people.

With specific objectives and activities, Myanmar Agenda 21 has identified the following programme areas: 1. Accelerate sustainable development of forest resources, 2. Develop the forestry sector to meet basic needs, 3. Promote efficiency in the production of forestry goods and services, 4. Strengthen forestry policies, legislation and institutions, and 5. Enhance people's participation in forestry development and management.

To ensure environmental sustainability, Myanmar Millennium Development Goals have targeted the integration of environmental and

sustainable development considerations into country policies and programmes and the reversal of the loss of environmental resources. It has described an indicator as proportion of land area covered by forests (Appendix 2). Adapting the Millennium Development Goals (MDGs) within the context of the National Plan and as per stipulation in the 1995 Myanmar Forest Policy, 30 % of the total land area of the country be eventually gazetted as Reserved and Protected Public Forests and up to March 2006, the total area already constituted as both types of forests is 60679 square miles (157158 km²) or 23.23% of the total land area (MNPED, 2006a). For sustainable development of the forestry sector, the number of trees and acres planted from 1988/89 to 2005/2006 was 107 million trees and 2.4 million acres and the increment was 2.7 times (MNPED, 2006b).

According to the 30-Year National Forest Master Plan (2001/2002 to 2030/2031), at the beginning of 2001 can be legally classified as, reserved forests-16.46 % (11.11 million ha), protected public forests, 2.67 % (1.47 million ha), that is, 19.13% of the total country's area. The challenge to the 30-Year National Forestry Plan is sustainable forest management covering 40% of the total area of the country as reserved forests, protected public forests and protected areas for biodiversity conservation and sparing 11% of forests for other land uses (MOF,2001b). About 30% of the total land area is still unclassified forests and it should be brought under reserved forests system and protected areas system as soon as possible to get firm legal binding. The annual deforestation rate is about 544,060 acres, that is, 0.3% of total country's area (MOF 2001b). Another source indicates that the annual deforestation rate is

about 5200 square km, that is, 1.4 % of total country's area, which is the highest along with the Philippines, among ASEAN countries (L.D. Nguyen, 2004). Myanmar Selection System must be effectively applied in managing the natural forests of the country. Silvicultural and cultural treatments must be done effectively with more restrictions on annual allowable cut (AAC) and area control in harvesting timber. Myanmar Timber Enterprise has been using 2940 working elephants (1800, state owned and 1140, privately owned) as working force (MOF 2001b), resulting in least disturbance to the environment compared to using heavy

machines. The central dry-zone of Myanmar is a harsh environment covering an area of about 8.72 million ha. The current activities of the Dry Zone Greening Department, such as, reforestation for local supply and greening (125294 acres had been reforested up to 2000), and protection of remaining natural forests, in central dry-zone should be encouraged both from conservation and carbon sequestration perspectives. Myanmar ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1994 (ASEAN SoE 2000) and the Kyoto Protocol in 2003 (ASEAN SoE 2005).

Rationale

To be sustainable, forest management must strive to maintain timber value as well as environmental and social values. Forests are reservoirs for biodiversity and commonly act as carbon sinks. Myanmar is second to Indonesia *in* having a forest volume of 2869 million m³ and forest biomass of 8252 million tonnes (ASEAN SoE, 2005).

Forest covered area is 50.20 % of the total land area of the country as indicated by the forest resources assessment conducted in 1997 (MNPED, 20006a). (Please refer to Table 1 that acknowledges contributions by forest resources and biodiversity in relation to environmental sustainability.) The forest policy underlines sustainable forest management without impairing the production capacity, while meeting the social and community needs and conserving biological diversity and environmental stability (FD, 1995a).

The main problems currently encountered are, encroachment into natural forests for agriculture, infrastructure, factories and settlements as population increases; illicit cutting of trees for commercial purpose; extension of grazing land; shifting cultivation; and excessive utilization of firewood (MNPED, 2006a). Many forest resources are threatened by overexploitation, degradation of environmental quality and conversion to other types of land uses.

The main challenge is to ensure a sustainable management of forest resources which comprises effective implementation of Myanmar Selection System; adoption of a proper integrated land use policy; increase of reserved forests to 30% as stipulated in the forest policy; protection of forests by legislative means and through people participation; establishment of community fuel-wood plantation and encouragement to increasingly use wood-fuel substitutes or fuel efficient stoves to ease pressure on the natural forests; increased utilization of lesser used species and promotion of downstream processing to produce value added wood products (MNPED, 2006a) and avoiding overexploitation and degradation, so as to maintain adequate supply of wood for production and ensuring the provision of essential environmental services, including biodiversity and carbon sinks (OECD, 2001). The security of legitimate forestry land use and nature conservation land use (protected area system) should be guaranteed. The second criterion of 'criteria and indicators for sustainable forest management' approved by the Ministry of Forestry is the security of permanent forest estates, *that is*, the status of reserved forests, national parks, wildlife sanctuaries, *and* protected public forests must be secured by all means.

Objective

To enhance sustainability of forest resources ensuring both for the present and future generations

Activities to be completed within 5 years including ongoing ones;

1. Formulate and implement a national land-use policy that allocates *the* country's land for various uses, including legitimate forestry and conservation land uses. Discourage policies that encourage resource degradation and conversion of forest ecosystems into other less valuable land uses.
2. Determine the Annual Allowable Cut (AAC) based on the needs of the changing socio-economic, environmental and silvicultural considerations and limit harvesting of timber of all species to the specified AAC.
3. Prescriptions in forest working plans should be observed for sustainable forest management.
4. The government needs to provide a mechanism for involvement of international/local institutions, local communities and NGOs, in forest planning, implementation, and evaluation.
5. Conduct Environmental Impact Assessment (EIA) of forestry projects.

Objective

To protect soil, water, wildlife, biodiversity, etc

Activities to be completed within 5 years including on-going ones;

1. Classify unclassified forests as Protection Forests in order to arrest degradation and promote forest cover.
2. Impose effective law enforcement against encroachment, poaching, illicit logging and illegal extraction of forest products and effective monitoring along trans-boundary against illegal trade of forest products, wildlife and its parts and orchids, etc.
3. Reforest the watershed areas to restore the forest cover in critical watersheds.
4. Encourage RIL application utilizing elephants in timber extraction and discourage utilization of heavy machines which is environmentally not friendly.

6. Discourage clear cutting system in production forests but encourage selection felling system.

7. Endorse and implement National Code of Harvesting.

Activities to be completed within 10 years including ongoing ones;

8. Observe and follow the criteria and indicators for sustainable forest management of Myanmar emphasizing on monitoring and evaluation.

9. Undertake studies to include natural resource accounting in the planning and budgetary process.

10. Undertake a pilot project to study the valuation of goods and services to assess full social and environment costs of forest and forest products and develop methodologies for the internalization of social and environmental costs.

11. Always encourage sustainable forest management with ecosystem approach.

12. Revise National Code of Harvesting.

5. Conduct reduced impact logging techniques.

Activities to be completed within 10 years including ongoing-ones;

6. Increase reservation of forests from the present 16.40 % to 30 % of total land area of the country in the year 2010 by the latest.

7. Establish more seed orchards and seed production areas.

8. Rehabilitate degraded mangrove forests in Ayeyarwady Delta, Rakhine State and Tanintharyi Division.

9. Promote private forestry development.

Activities to be completed within 15 years including on-going ones;

10. Encourage the current objectives, programmes and activities of Dry Zone Greening Department.

Objective

To fulfil basic needs of the people for fuel, shelter, food, recreation, etc.

Activities to be completed in 5 years including on-going ones;

1. Promote ecologically sustainable development such as, eco-development, buffer zone management, or formation of forest gardens (trees, cash crops, medicinal plants and any income generating plant grown together) created and owned by individuals, for the benefit of local people.

Objective

To raise public awareness about the vital role of the forests in socio-economic development of the nation.

Activities to be completed within 5 years including on-going ones

1. Aim to stop slash-and-burn, shifting cultivation farming methods especially in intact forests.
2. Shift forest protection strategy from pure police work to extension education and community involvement.
3. Motivate and expand participatory forestry/ agroforestry on degraded lands, village tracts and farm lands.

Objective

To promote participation of the people in conservation and utilization of forests.

Activities to be completed within 5 years including on-going ones.

1. Encourage people's participation in planting trees in degraded forests, barren lands, village tracts, farm yards and household compounds or homesteads for self-sufficiency of fuel-wood and other forest products (FD 1995b).

11. Prioritize afforestation and reforestation in degraded lands and encourage enrichment plantations in natural forests.

2. Improve productivity of forest plantations, agro-forestry, and agriculture, and provide alternative sources of income to reduce the pressure on natural forests;
3. Check shifting cultivation by introducing agro-forestry, community forestry (FD 1995b), sloping agricultural land technology (SALT), on cleared lands without shifting and clearing of natural forests any further.
4. Establish mechanisms for benefit sharing in community forestry programmes through preparation of statutory agreements and other legislative supports.

Activities to be completed within 10 years including on-going ones;

4. Strengthen the extension division of the Forest Department both in terms of manpower and resources to plan, implement and monitor forestry extension activities.
5. Develop programmes to create awareness of community forestry and the significance of the problem it seeks to address.
6. Collect information on forest resources which include practical knowledge on the state of forests as well as their potential economic, social and ecological values.

2. Encourage tree planting in urban areas. Encourage business people to set up small forest enterprises. Enhance awareness raising in sustainable harvesting from forest plantations.
3. Establish a mechanism to allow the effective involvement of NGOs in providing inputs to all aspects of forestry development and intensify active participation of NGOs in programming implementation.

4. Let men, women, youth, local communities, and *those from* all walks of life be involved in implementation of national forest action plans.
5. Develop programmes for *farmer* training courses and cross-farm visits in relation to forest works.

Objective

To promote efficiency to harness the full economic potential of forest resources in an environmentally friendly manner.

Activities to be completed within 5 years including on-going ones.

1. Review the structures of the Planning and Statistics Department and Forest Department of the Ministry of Forestry for effective evaluation, monitoring and implementation of forest policies, forest works and for effective enforcement of the forestry legislation.
2. Improve infrastructure and facilities and restructure the Forest Research Institute to undertake research priorities relating to Sustainable Forest Management.
3. Prepare a forestry research development plan to include priorities with a short, medium and long-term perspective.
4. Upgrade the present curriculum, and develop a mechanism for establishing formal linkages between forestry educational institutions and foreign universities for meeting specialized training needs in the forestry sector.

Activities to be completed within 10 years including on-going ones:

5. Establish a mechanism for collaboration and promotion of forestry research through research networking or research contracts with universities, NGOs, etc.

6. Promote the development of NWFP to meet sustenance needs and provide research support to determine methodology of harvesting and processing NWFP on a sustainable basis.
7. Strengthen existing educational training facilities, teaching materials, and enhance capacity and quality of institutions providing professional, technical and vocational trainings to meet the increasing manpower needs of the forestry sector.
8. Prepare logging plans by integrating RIL methodology including road constructions prior to harvesting to minimize forest floor disturbances and to ensure scientific but cost effective harvesting with assurance of minimizing wasteful harvest.
9. Promote training courses for proficiency on forest-based industries and pricing policy.
10. Establish effective logging system for logging system for natural forests and plantations by revising National Code of Forest Practices and by developing Code of Harvesting Practices for plantations.

Study the possibilities and prospects of forest-based sustainable industrial development in Myanmar and also study and monitor the markets, profitability and competitiveness of the forest-based industry ensuring optimum resource utilization and reduction of wastage.

3.1.2 Biodiversity Conservation

Lead Institution:

Ministry of Forestry

Collaborating Institutions

Ministry of Education, Ministry of Information, NCEA, and related departments, agencies and NGOs.

Overview

As a developing country, Myanmar is no exception in facing environmental issues such as, unsustainable land use practices, not having clear cut land use policy, illegal wildlife trade along trans-boundary; weak law enforcement, inadequate trained staff and human resources, insufficient funds and equipment. The main challenge is to exert strenuous efforts to conserve the country's biological resources and to meet the 2010 target through the establishment of a network of protected areas, with active participation of local communities, and all stakeholders including relevant institutions and non-governmental organizations (MNPED, 2006a).

The present protected areas system in Myanmar reflects the recommendations of the 1981-84 'Nature Conservation and National Parks Project' (FAO 1985) and followed up recommendations by MacKinnon et al. (1986). These should include representative samples of all the major ecological divisions of the country as well as areas with rare or unusual species or ecosystems and landscapes of outstanding beauty, ecological, scientific, and spiritual value. Dinerstein et al. (1993) described Myanmar as a country of one of the biodiversity hotspots, having a high percentage of forest cover remaining with high species richness and endemics. Myanmar Agenda 21 pointed out the existing PAS, the need to be more broad-based and representative covering various ecosystems and species, and identified 2 programme areas, namely: *1. Strengthen protected area planning and management; and 2. Conserve biodiversity.*

The country is endowed with impressive fauna and flora. There are about 11,800 number of plants in Myanmar (Kress et al. 2003), including 1696 species of climbers, 65 species of rattans, 841 orchid species (MOF 2001b) and more than 300 species of mammals, 360 reptiles, and about 1,000 bird species have been recorded (FAO 1983). This biodiversity richness contributes to environmental sustainability of the country. Of the wildlife species, quite a number of them are listed in the 1998 IUCN's Red Data Book, based on currently available information on internationally threatened wildlife species that occur in Myanmar (Salter 1983). Today, many ecologically fragile and

endemic species are highly endangered and risk extinction. Without official permits no one is allowed to hunt, collect and trade in any wildlife species according to the 1992 Myanmar Forest Law and the 1994 Protection of Wildlife, Wild Plants and Conservation of Natural Areas Law. The aims of wildlife management are sustainable use of wildlife resources within the capacity of renewable rates while giving conservation priorities for rare and endangered species. Toward this end, the 1994 Protection of Wildlife, Wild Plants and Conservation of Natural Areas Law, provides for declaring, any of the three categories (completely protected, normally protected and seasonally protected) for any species of either flora or fauna. Currently 40 species of mammals, 50 species of birds, and 9 species of reptiles have been listed as "Completely Protected"; 12 species of mammals, 43 species of birds and 6 species of reptiles are listed as "Protected" and 2 species of mammals and 13 species of birds are "Seasonally Protected" (FD 1994). However, the depletion of Myanmar wildlife and forest resources cannot be checked unless the huge consuming markets in neighbouring China and Thailand are taken into serious consideration through CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora and CBD (Convention on Biological Diversity), and measures adopted urgently.

To ensure environmental sustainability according to MMD Goals, an indicator is land area protected to maintain biological diversity (Appendix 2). The specific aim of Myanmar Agenda 21 is to facilitate the incorporation of environmental and sustainable development policy considerations into decision-making and policy formulation processes of the government in economic and social sectors (MNPED, 2005).

So far 42 protected areas (Appendix 1) encompassing 49383 km² i.e. 7.30 % of the total areas of the country have been notified, proposed and included in the protected area system. Out of 34 protected areas with 26612 km² covering 3.93% of the total area of the country, only 20 are under Nature and Wildlife Conservation Division of Forest Department and are being well managed (FD 2007). The remaining protected areas, managed under

Directorates of State/Divisions of Forest Department are badly in need of conservation inputs for effective biodiversity conservation. These are poorly or inadequately managed on account of institutional, financial and human capacity constraints. Some of the notified areas are very small and some are very much disturbed having no conservation values at all (Saw Tun Khaing 1999). Myanmar has acceded to the Cartagena Protocol on Biosafety in 2001. Myanmar has ratified the Convention on Wetlands in 2004, and signed the ASEAN Declaration on Heritage Parks in 2003.

Mammals

The 'Wild Mammals of Myanmar' was the first recorded compilation of mammals in our country and was written chiefly to raise conservation awareness among the public (Tun Yin 1966). The recorded number of mammal species in Myanmar is 300 and 6 species are endemic (Dinerstein et al. 1993). The effective conservation of mammals, both large and small, will enhance the protection of other taxonomic

Reptiles and Amphibians

As with mammals and birds, the conservation needs of most species of reptiles and amphibians can be met by ensuring that adequate areas of habitat are set aside and protected. The number of species of reptiles recorded worldwide is 7970, of which 296 species are threatened, and the recorded number of amphibian species is 4950, of which 296 species are threatened (IUCN 2000). The official statement of the Forest Department of Myanmar, for the total number of species of reptiles and amphibians in the country is 360 (FD 1999). According to Dinerstein et al. (1993), the number of amphibian species recorded was 75 and the number of reptile species recorded was 241. The latest record was 97 amphibian species and 199 reptiles in 2003, with 14 species new to science, according to an amphibian and reptile survey which was sponsored by California Academy of Science and the Forest Department (Tun Win 2003). However this survey has not covered the whole area of the country yet. Non-marine turtles, being slow moving and dependent on specific habitats, are vulnerable and easy to capture.

Myanmar has signed the Agreement on the Establishment of the ASEAN Centre for Biodiversity in 2005.

Roughly 5000 species of animals and 28,000 species of plants have been included in the CITES lists against over-exploitation through international trade (ASEAN SoE 2005) have been included. Myanmar ratified CITES in 1997 and CBD in 1994. Myanmar has acceded to the Plant Protection Agreement for the South East Asia and the Pacific Region in 1956.

groups, and conservation needs can be met by setting aside and protecting, in as natural a state as possible, adequate and representative areas of habitat. However for a number of species or groups of species, especially those that are rare or endangered, additional measures will need to be taken (Uga 2001, 2002).

The survival of several turtle species is being challenged, particularly those whose ranges are small, as also those species which are endemic and have a low reproductive capability due to late sexual maturity, small brood size and low survival rate. The Tortoise and Freshwater Turtle Specialist Group of IUCN has recently recommended all freshwater turtles of Asia should be listed at least on CITES, indicating that crucial role required of both range and consuming countries for effective conservation activities.

Sea turtles are long lived, highly migratory reptiles that range the tropical and sub-tropical oceans worldwide. They are currently considered as endangered species. The threats are intense local egg takes, shrimp trawls, commercial exploitation of adults and immature ones for food and leather, loss of and disturbance to nesting habitats, marine and coastal contamination, especially plastics as current threats. Of the seven living turtle species found around the globe, six are known to reside in Southeast Asia, Myanmar has 4

species namely, Green turtle (*Chelonia mydas*), Loggerhead (*Caretta caretta*), Hawksbill (*Eretmochelys imbricata*) and Leatherback (*Dermochelys coriacea*), Marine turtles are classic examples of shared resources and only through international cooperation can these resources, as well as the habitats on which they depend, be adequately conserved and managed for the good of many societies. Realistic conservation practices must be integrated with,

and supported by, the communities that interact with the turtles and their habitats. Because they migrate thousands of kilometres and take decades to mature, turtles serve as important indicators of the health of coastal and marine environments on both local and global scales. To ensure the survival of economically important species of both marine and non marine reptiles, additional safeguards will be required (Uga 2001, 2002).

Birds

Quite a number of surveys have been carried out by native and expatriate scientists, covering about two third of the total area of the country and after recording and check-listing a total of 953 species (BANCA, 2007), it is believed that Myanmar may have at least, the commonly estimated number of 1000 species (Smithies 1953). In 1993, the recorded number of bird species in Myanmar then was 967 (Dinerstein et al. 1993). Worldwide, 9946 species of birds have been recorded and 1183 species are threatened (IUCN 2000). Myanmar has one of the richest avifauna, for its size, of any country in the world and it can justifiably claim, in round numbers, 1,000 species (Smithies 1953). According to Robson (2000), Southeast Asia, comprising Thailand, Peninsular Malaysia, Singapore, Myanmar, Laos, Vietnam and Cambodia, so far has 1,251 recorded bird species. This indicates *the* extraordinary ornithological richness of Myanmar, both

globally and in relation to mainland Southeast Asia. According to 2004 IUCN's the world list of threatened birds, there are 43 species in Myanmar that are internationally endangered or vulnerable, but another source said 45 species are endangered in 2005 (BI 2005). Four species are endemic to Myanmar (King et al. 1975) namely, White-bellied Minivet (*Pericrocotus erythropygus*), resident at 2,000-6,000 feet in Myanmar except the central, Hooded Treepie (*Crypsirina cucullata*), resident below 3,000 feet in north, central and south Myanmar, White-browed Nuthatch (*Sitta victoriae*), resident at 7,500-9,200 feet on Mt. Victoria in western Myanmar and White-throated Babbler (*Turdoides gularis*), common resident on plains of western, central and southern Myanmar. Myanmar is among the most important 14 tropical countries for threatened birds but under protected and underfunded (Balmford et al. 1995).

Fishes

Very little is known about our freshwater and marine fishes and priority should be given to carry out studies in this area. The number of fish species recorded in Myanmar is 196 (Denerstein et al.1993). Giant Catfish (*Pangasianodon gigas*), critically endangered,

and Asian Arowana (*Scleropages formosus*), endangered, are both listed as occurring in Myanmar in the 2004 IUCN Red List of Threatened Species (BI 2005). However neither species has been confirmed as yet.

Invertebrates, fungi and micro organisms

We know very little about insects, and other arthropods, fungi, bacteria, other soil and sediment micro organisms and marine invertebrates. The only record available in Myanmar is 68 species of swallowtail butterfly species (Dinerstein et al.1993). Worldwide, the recorded number of invertebrates are, insects -

950000 species (about 600,000 of which are beetles), molluscs - 70,000 species, crustaceans - 40,000 species and 130,200 other species (IUCN 2000). The need for a stronger focus on the invertebrate groups has long been recognized. Checklist and inventories of invertebrates should be made in every

protected area with the assistance of renowned entomologists, arachnologists and other specialists, along with national scientists. More training courses on invertebrates and adequate

scientific direction are needed for NWCD staff and university students, and more investigation must be carried out in the interest of the country.

Plants

The 'List of Trees, Shrubs, Herbs and Principal Climbers of Burma' by Hundley et al.(1961), was the most comprehensive account of plants in Myanmar and is still a very useful reference in the field. Myanmar is known to have 7000 plant species, of which 1071 are endemic (FD 1999, Dinerstein et al.1993). And worldwide there are 5611 threatened plant species out of a total of 265,876 recorded (IUCN 2000). 'A Checklist of the Trees, Shrubs, Herbs, and Climbers of Myanmar' published in 2003 is the most up-to-date estimate with 11,800 number of plants in Myanmar (Kress et al. 2003). As with most other forms of wildlife, the most effective form

of conservation is through the establishment of a system of protected areas, in which the various forest types and the floral communities they contain are adequately represented; these may need to be supplemented by legislative for the protection of individual species which appear endangered or vulnerable. According to IUCN Red List of Threatened Plants for ASEAN, 1997, Myanmar has 3 endangered, 7 vulnerable, 14 lower risk and 8 invalid taxon, altogether 32 threatened species out of 7000 species, that is, 0.5% (ASEAN SoE 2000) and up to 2000, 3 sea grass species have been identified .

Rationale

Conservation of biodiversity has become a key concern nationally and globally. The main challenge is to maintain or restore the diversity and integrity of ecosystems, species and genetic material and to ensure a sustainable use of biodiversity. The conservation and sustainable use of biodiversity form an integral part of sustainable development, encompassing the integration of biodiversity concerns into economic policies as well as measures to protect areas, habitats and species. One good environmental indicator is the number of threatened or extinct species compared to the number of known species. Data cover mammals, birds, fish, reptiles, amphibians, and vascular plants. Invertebrates and fungi are not covered at the present time. Another good indicator is 'protected areas' i.e. land areas under management categories I to VI of the World Conservation Union, which refer to

different levels of protection. According to Myanmar Forest Policy of 1995, the protected area coverage should be at least 5 % of the total area of the country (FD 1995a). However, Myanmar is ecologically very diverse and will therefore ultimately need more protected areas than other countries of equivalent size. At least 10 % of the total land area of our country should be under a well managed protected area system as soon as possible, by the year 2010, the latest, large reserves are needed especially for animals which migrate seasonally and which roam widely in search of food, water, and proper habitat. It has been advised by competent ecologists and scientists that Myanmar should cover at least 10 % of the total area of the country under its protected area system to include representatives of all ecosystems occurring in the country (Bolton et al. 1994).

Objective

To promote *In-situ* conservation and effective wildlife management.

Activities to be completed within 5 years including on-going ones;

1. Increase to 10 percent of the total area of the country as 2010 objective by addressing

gaps in coverage of globally threatened species and Key Biodiversity Areas (KBAs) and as per IUCN categorization under the PAS ensuring that all notified protected areas are well managed and looked after [*In-situ Conservation*].

2. Notify the proposed 8 protected areas as soon as possible.
 3. Establish wardens' offices at notified protected areas of biodiversity richness, which are nationally important, regionally significant and globally outstanding.
 4. Prioritize establishment of a warden's office for Lampi Marine National Park.
 5. Implement focused conservation actions for priority species (BI 2005).
 6. Forge partnership between biodiversity conservation and rural development initiatives.
 7. Promote conservation education programmes.
 8. Introduce buffer zone management in peripheral areas around protected areas.
 9. Strengthen ex-situ conservation and research roles of botanic and zoological gardens.
 10. Conduct status surveys of priority species, studying their distribution and link results to conservation management.
 11. Check loss of biodiversity outside protected areas.
 12. Strengthen conservation and management of biological diversity and promote sustainable use of biological resources in line with the Convention on Biological Diversity and national policies.
 13. In line with the aim of Myanmar Agenda 21, incorporate environmental considerations into the country's development plan at the national decision-making level.
 14. Protect and restore damaged habitats having endangered species.
 15. Offer local communities the chance to contribute to biodiversity conservation.
 16. Finalize the ongoing process of formulating the Myanmar Biodiversity Strategy and Action Plan and implement it with *participation of all the stakeholders*.
 17. Raise environmental awareness among all walks of life and provide the public access to information on biodiversity issues as part of biodiversity conservation.
 18. Prioritize to conserve pristine, intact mangrove forests on Lampi Marine National Park and those intact mangrove forests on islands of Myeik Archipelago.
 19. Promote regional coordination to protect the ASEAN Heritage Parks and Reserves.
 20. Participate actively in the ASEAN Working Group on Nature Conservation and Biodiversity.
 21. Participate actively in the ASEAN Regional Action Plan on Trade in Wild Fauna and Flora.
 22. Collaborate with India, China, Thailand and Bangladesh, the CITES signatories, to check illegal trade of forest and wildlife products along trans-boundary.
 23. Strengthen the capacity of local NGOs and academic institutions to develop and implement conservation projects.
 24. Support the development of conservation curricula at basic education.
 25. Mainstream biodiversity into other policy sectors.
 26. Implement priority needs for mammals.
 27. Implement priority need for reptiles and amphibians.
 28. Implement priority needs for birds.
 29. Implement priority need for plants.
- Activities to be completed within 10 years including on-going ones;
30. Develop a realistic mechanism to strengthen conservation of priority sites (BI 2005).
 31. Integrate biodiversity into decision-making processes for land use and development interventions in the Priority Corridors (BI 2005).
 32. Take range-wide conservation actions for certain widely dispersed priority species.
 33. Promote well-designed and controlled ecotourism.
 34. Strengthen institutional capability of NWCD of Forest Department and also NCEA as well.
- Develop an organizational infrastructure aiming at an independent Department of Wildlife and Protected Areas under a separate DG responsible to Ministry of Forestry.

3.1.3 Sustainable Freshwater Resources Management (Environmental Perspective)

Lead Institution

City Development Committees, Ministry of Progress of Border Areas and National Races and Development Affairs

Collaborating Institutions

Ministry of Agriculture and Irrigation, Ministry of Transport, NCEA, related departments, agencies and NGOs.

Overview

Annual internal renewable fresh water resources of Myanmar was 880.6 cu km, which is quite high and second only to Indonesia among the ten ASEAN countries and the sectoral withdrawal was domestic 7%, industry 3% and agriculture 70% (ASEAN SoE 2000). The major rivers in Myanmar are Ayeyarwady, Chindwin, Sittaung and Thanlwin and the total inland navigable waterway is 6500 km. The programme areas with specific objectives and activities by Myanmar Agenda 21 were: 1. *Strengthen integrated water resources policy, planning and management systems*; 2. *Improve water supply and environmental sanitation and* 3. *Improve management of aquatic ecosystem including wetlands.*

The Irrigation Department of the Ministry of Agriculture and Irrigation has been trying to become Global Water Partnership and is drafting statutes for Country Water Partnership (MOAI, 2007). The proportion of population with sustainable access to an improved water source is another indicator to ensure environmental sustainability (Appendix 2). The percentage of population with access to safe water was 20% in 1980, 60% in 1995 and 67% in 2000 (ASEAN SoE 2000). With regards target 10 of MMD Goals, which is to halve the proportion of people without sustainable access to safe drinking water, the Ministry for Progress of Border Areas and National Races and Development Affairs has been carrying out a programme for safe drinking water supply for the water scarce rural areas. The programme was carried out during the third Short Term Five-Year Plan (2001/02 to 2005/06). Before the

water supply programme commenced, there were 52010 villages of which 28785 villages had access to safe drinking water and 23225 villages with lack of safe water supply. Out of 23225 villages, 879 villages are without water supply. Hence, the government has laid down priority to implement water supply programme to these villages in various States and Divisions. During the plan period spanning 2001/02 to 2005/06, 504 villages out of 879 villages without water supply, 5140 villages out of 9166 villages with inadequate water supply, 6000 villages out of 13180 villages without safe drinking water are reported to have access to safe drinking water supply. Thus, on completion of the programme 11644 villages are supposed to have access to safe drinking water supply bringing the total number of villages with safe drinking water supply to 40429 (MNPED 2006a). While rural supply programme is carried out for the rural populace, urban water supply is also undertaken by Yangon City Development Committee (YCDC) and Mandalay City Development Committee (MCDC) and are providing water supply to Yangon and Mandalay from surface water and ground water.

The Environmental and Sanitation Division under the Ministry of Health is implementing water supply system to health institutions and also undertaking Water Quality Surveillance and Monitoring System Pilot Projects. Due to these efforts, the percent of total population with access to safe drinking water was 72 percent according to 2000 Multiple Indicator Cluster Survey (MICS) data exceeding the year

2015 target of 66 percent. However the quality of water and water supply facilities still need to improve. Progress for access to Safe Drinking Water (Appendix 2) as of MICS by the Ministry of Health was, urban 38%, rural 30% and total 32% in 1990; urban 89%, rural 66%, total 72% in 2000; and urban 92%, rural 74% and total 79% in 2003 (MNPED, 2006a).

The proportion of people with access to improved sanitation was 20% in 1980, 35% in 1990; 43% in 1995, 63.1% in 2000; and 76.1% in 2003 (ASEAN SoE 2000, MNPED 2006a). Regarding improved water supply, many water agencies, particularly, the Department of Development Affairs, Ministry of Progress of Border Areas & National Races has been undertaking the supply of adequate improved water to the urban as well as rural communities. The Environmental Sanitation Division (ESD), of the Department of Health (DOH) under the Ministry of Health (MOH) has been carrying out health institutional water sanitation activities and drinking water quality surveillance and monitoring pilot projects. One of the guidelines of the National Health Policy (1993) is to intensify and expand environmental health activities including prevention and control of air and water pollution (Victor et. al 1997).

The Annual National Sanitation Week initiated in 1998 was the most effective advocacy campaigns throughout the country resulting in enormous success in boosting community awareness and increasing sanitation coverage. The proportion of people with access to

Rationale

All social and economic activity relies heavily on freshwater. Water is becoming scarce in many countries and the management of water resource is of paramount importance. Myanmar is facing increasing freshwater supply problems, particularly in *the* dry zone. Although there has been no guidance on the quantity of domestic water that is required to promote good health, one source indicates that a minimum of 7.5 litres of quality water per capita per day will meet the basic requirements of most people under most conditions (Guy Howard et. al 2003). Issues associated with freshwater are population growth in big towns,

improved sanitation was another indicator, and were in 1990 - urban 39%, rural 34%; in 2000-urban 83%, rural 56.5% and in 2003 - urban 92.6%, rural 76.1% (MNPED, 2006a). The percentage of population with access to sanitation was 20% in 1980, 43% in 1995 and 61% in 2000 (ASEAN SoE 2000). Yangon City Development Committee, Mandalay City Development Committee and Nay Pyi Taw Development Committee are responsible for control of water pollution in Yangon, Mandalay and Nay Pyi Taw respectively. The Myanmar Investment Commission issued a notification in June 1994 (NCEA 1997) requiring all permitted enterprises to install sewage treatment plants, industrial waste water treatment plants and other pollution control procedures and abide by the sanitary and hygienic rules and regulations.

Regarding Indicator 31 of target 11 (proportion of people with access to secure tenure), see Table 1, Myanmar is paying attention to improve the living standard of the entire people especially the rural people, as 70% of the total population reside in rural areas. Since 1989-90, Yangon City Development Committee and Mandalay City Development Committee and private entrepreneurs were implementing low cost housing projects and hut to apartment projects. There were 3388 residential units as per low cost housing projects implemented between 1989 and 2000; and there were 12671 residential units as per hut to apartment projects implemented between 1989 and 2006 (MNPED 2006a).

industrialization, urbanization, overuse, inadequate supply in big towns, pollution both from industrial and domestic wastes. Pollution loads from diffused agricultural sources are an issue in many countries, as is the supply of permanently safe drinking water to the entire population.

Water quality closely linked to water quantity, is of economic, environmental and social importance. Freshwater resources are of major environmental and economic importance. When consumers do not pay the full cost of water, they tend to use it inefficiently.

Sustainable management of water resources has become a major concern in many countries: it can affect human health and the sustainability of agriculture. The efficiency of water use is key in matching supply and demand. Reducing losses, using more efficient technologies and recycling are all part of the solution, but applying the user pays principle to all types of users will be an essential element of sustainable management. Another important

element is the application of an integrated approach to the management of freshwater resources by river basin. Performance can be assessed against domestic objectives and international commitments. The main challenge is to ensure a sustainable management of water resources, avoiding overexploitation and degradation, so as to maintain adequate supply of freshwater of suitable quality for human use and to support aquatic and other ecosystems.

Objective

To enhance management of integrated water resources and aquatic ecosystem including wetlands.

Activities, to be completed within 5 years including on-going ones;

1. Implement the integrated water resource management by using the river basin approach.
2. Protect and restore all bodies of surface and ground water to ensure the achievement of water quality objectives.
3. Systematize river classification.
4. Establish proper sewage treatment system and construct waste water treatment facilities in selected cities and areas.
5. Raise public awareness of water issues followed by public participation. Prepare for equitable allocation of water between competing demands in the face of growing water use.
6. List more wetlands in the ASEAN's wetlands of international importance.
7. Add Indawgyi as one of the major lakes of ASEAN countries.
8. Participate in Water Resources Programme of Mekong River Commission as a Member Country.

Activities to be completed within 10 years including on-going ones;

9. Apply an integrated management of water resource based on the ecosystem approach.

The government needs to seriously undertake an integrated water management programme, taking into account improvement in accessibility to freshwater, and water conservation and community participation.

10. Reform the existing management system to promote integrated planning and management, maximize development and protection of water resources and ensure efficient water use.

11. Monitor and evaluate river water quality.

Activities to be completed within 15 years including on-going ones;

12. Enhance the efficiency, equity and productivity of water uses in agriculture, urban, industrial and other sectors.
13. The private sector needs to promote efficient water use and to reduce water pollution gradually, with a view to finally conduct zero pollution practices in the future.
14. The government, the private sector, and the NGOs need to promote local water management practices such as traditional water storage and management practices, rainwater harvesting and groundwater replenishment techniques.

3.1.4 Environmental Quality Management and Enhancement

Lead Institution

NCEA

Collaborating Institutions

Ministry of Industry (1), Ministry of Industry (2), Ministry of Transport, Ministry of Rail Transportation, Ministry of Energy, Ministry of

Mines, Ministry of Agriculture and Irrigation, Ministry of Forestry, and related departments, agencies and NGOs.

Overview

With specific objectives and activities, Agenda 21 identified four programme areas: namely,

1. Strengthen the comprehensive water quality management programme;
2. Strengthen the air quality management programme;
3. Improve the solid waste management programme; and
4. Promote environmentally sound management of toxic chemical and hazardous wastes.

To ensure environmental sustainability, according to MMD Goals, indicators (Appendix 2), such as carbon dioxide emissions and atmospheric pollution; ozone depletion and the accumulation of global warming gases (MNPED, 2006a), Myanmar signed the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 and ratified the convention in 1994. Myanmar acceded to the Kyoto Protocol in 2003. The emission of CO₂ was estimated in 1997 under the Asian Least Cost Greenhouse Gas Abatement Strategy (ALGAS) Project financed by the Asian Development Bank and the United Nations Environment Programme. There are some Methane emissions from paddy fields. The effect of Myanmar on global warming and climate change on the whole is minimal on account of large area of forest cover which acts as a carbon sink. CO₂ emission has yet to be updated. CO₂ emission in metric tons per capita in 1990 was 0.9 metric tons (ALGAS). CO₂ emission per capita (tons/person/year) was 0.725 in 1997, which was lower than in Indonesia, Malaysia, Philippines and Vietnam (Htay Aung 1997). Myanmar acceded to the Vienna Convention and Montreal Protocol in 1993. Regarding high ozone-depleting CFC

consuming countries, in 2001, Myanmar consumed 39, Malaysia consumed 1950, Thailand consumed 3380 and Vietnam consumed 243 metric tonnes per annum respectively (ASEAN SoE 2005). The consumption of Ozone Depleting Substances (ODS) particularly CFC 12 is only 54.3 metric tons per annum and this level has been frozen over the past decade and will be reduced by fifty percent starting from 2005 (MNPED, 2006a). The consumption of ODS is planned to be phased out in 2010 under the Ozone Country Programme (MNPED, 2006a). Regarding ozone related multi-national environmental agreements, Myanmar ratified the Vienna Convention, Montreal Protocol and London Amendment to the Montreal Protocol in 1993 (ASEAN SoE 2000). Air pollution emissions in Myanmar are Carbon Monoxide - 6710ug/m³, Nitrogen Oxide -194ug/m³, non-methane Volatile Organic Compound - 572ug/m³ and Sulphur Dioxide - 56.6µg/m³ (ASEAN SoE 2005). Myanmar signed the ASEAN Agreement on Trans-boundary Haze Pollution in 2002. The latest scientific assessment on global warming conducted by the Intergovernmental Panel on Climate Change (IPCC), has reported among others, that the average surface temperature has increased by about 0.6°C; that snow cover and ice have decreased; and that the sea level has risen by 10 to 20 centimetres and all of these were due to man-made activities (ASEAN SoE 2005). Environmental pollution and environmental hazards arise from industrialization and increased urbanization. The challenge for developing countries such as Myanmar is to manage and reduce the risks to human health from development. Urbanization creates

pollution in town and city centres. Air pollution from dusts and exhaust fumes from the increased number of cars are not easily dissipated in crowded town and city centres. Population densities and inadequate infrastructure for waste and sewage disposal cause pollution to water, and to the environment. Industrialization and the establishment of factories and manufacturing plants in town and city areas, is also a major factor in increasing all forms of pollution.

Regarding indoor air pollution, Myanmar being a primarily agricultural country, as much as 95% of households use solid fuels such as firewood for cooking, however among ASEAN countries, Myanmar had the lowest carbon dioxide

Rationale

The accelerating rise in the earth's temperature calls for cut in carbon emissions by half by 2050 (UNEP 2007). There is a tendency to shift from a carbon to a hydrogen based energy economy, including the shift of subsidies from fossil fuels to wind, solar, and geothermal energy sources. Water quality management, air quality management, solid waste management and environmentally sound management of toxic chemicals and hazardous wastes need to be strengthened and upgraded. It is necessary to adopt antipollution measures in the manufacturing industries of Myanmar. Preventive and precautionary approaches should be preferred to curative solutions. Atmospheric pollutants from energy transformation and energy consumption, but also from industrial processes, are main contributors to air pollution. Major concerns relate to their effects on human health and ecosystems. Causes of growing concern are concentrations of fine particulates, NO₂, and toxic air pollutants. Degraded air quality can result in unsustainable development patterns and it can have substantial economic and social consequences. The depletion of the ozone layer could have major or significant effects on sustainable development. Performance can be assessed against national objectives and international commitments, such as the Montreal Protocol (1987). Climate change is caused by increased concentration of greenhouse gases, notably carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O)

emission ranging from 4% to 7% (ASEAN SoE 2005).

Of all the pollutants released into the environment every year by human activities, Persistent Organic Pollutants or POPs are among the most dangerous ones. To protect human health and the environment from the harmful impacts of POPs, Myanmar acceded to the Stockholm Convention on POPs in 2004. It focuses initially on 12 chemicals such as aldrin, chlordane, dieldrin, DDT, endrin, heptachlor, hexachlorobenzene, toxaphene, mirex, polychlorinated biphenyls, dioxin, and furan. Some are pesticides and the others are industrial chemicals and by-products of industrial processes or combustion.

due to combustion of fossil fuel, industrialization, deforestation and agricultural practices. Land use changes and forestry also contribute to the greenhouse effect by altering carbon sinks. Climate change is of concern mainly as relates to its impact on ecosystems (biodiversity), human settlements and agriculture, and possible consequences for other socio-economic activities that could affect global economic output (OECD, 2001).

Water pollution is caused both by industrial and domestic activities. In urban areas, the main sources of water pollution are untreated sewage, industrial and household wastes directly discharges into water bodies. In rural areas, unprotected water bodies permit contamination by animal and human wastes. As regards domestic sources of pollution, waste water discharge from household sources is the main contributor to pollution. Fumes emitted by the production processes of factories and vehicles cause air pollution. Air pollution is due to excessive discharge of particulates, fumes and chemicals into the atmosphere and their suspension in the atmosphere for long periods of time. Air pollution in urban areas such as Yangon is mostly caused by vehicular emissions.

Wastewater management is an integral element of water quality management, the objective being to minimize pollutants returned to the water to maintain high water quality. Sewage collection and treatment facilities are important infrastructure for water pollution

control but require a large capital investment and budget for effective operation and maintenance.

Solid wastes include all domestic refuse, commercial wastes, hospital wastes, street sweepings, construction debris, and septic tank sludge. The solid waste management problem is concentrated mainly at urban centres. Industrial wastes are being disposed by factories. Some factories discharge industrial waste water and effluents into the rivers via open drains or existing natural streams without any proper treatment. These practices are causing pollution.

Hazardous wastes are generated from paper mills, leather factories and textile factories.

Objective:

To promote proper water quality, air quality, solid waste management and environmentally sound management of toxic chemicals and hazardous wastes.

Activities to be completed within 5 years including on-going ones;

1. Enact the drafted Myanmar Environmental Protection Law.
2. Develop air quality ambient standards taking into consideration of environmental standards in ASEAN countries.
3. Apply polluter pays principle.
4. Promote air pollution monitoring sites.
5. Encourage training for technical persons on air quality management.
6. Fix a rate to pay as pricing of water encourages greater efficiency.
7. Develop public awareness to promote community involvement in monitoring and disposal of domestic wastes.
8. Strengthen sewage system management and sewage treatment for domestic wastes, especially in big cities.
9. Network with other ASEAN countries for identification and dissemination of cleaner production technologies.
10. Educate the general public to promote environmentally sound waste management including waste reduction, recycling and composting.
11. Develop a framework for hazardous waste management.

Mercury is used as an amalgamation agent by small scale alluvial gold mines. There will be health problems associated with mercury contamination. Large scale extraction of metals results in hazardous waste problems.

Persistent Organic Pollutants (POPs), which are highly toxic, could be spread out to far distances easily and could be accumulated in the body tissues of people, mammals and other animals. POPs can cause cancer, allergies and hypersensitivity. POPs can damage the reproductive and immune systems of exposed individuals as well as their offspring and can also have developmental and carcinogenic effects.

12. Introduce water treatment and recycling system, using available technologies, for urban water supply especially in big cities.
13. Promote water quality management.
14. Encourage private investments in solid waste management services.
15. Implement the National Implementation Plan on POPs.
16. Establish a sustainable national inventory system on POPs.
17. Promote awareness and education on POPs.
18. Enforce the 2006 Conservation of Water Resources and Rivers Law.
19. Cooperate in carrying out River Water Qualities for ASEAN countries.

Activities to be completed within 10 years including on-going ones;

20. The government needs to improve its participation in the global efforts to mitigate climate change.
21. Enact a clean water law.
22. The government should encourage the private sectors and industries to take advantage of the emerging carbon-offset markets through the clean development mechanism under the Kyoto Protocol.
23. Try to get greater energy efficiency out of existing power stations and develop new, renewable energy sources such as solar, wind, hydro, tidal, ocean, bio-fuel and human power.

24. Promote energy efficiency standards and encourage the use of clean, safe technologies.
 25. Improve substitutes for CFCs and other ozone-depleting substances.
 26. Prepare to deal with acid rain and haze (that can be problematic in future) that float across frontiers.
 27. Participate in the ASEAN Cooperation Plan on Transboundary Pollution with emphasis on the Regional Haze Action Plan
 28. Cooperate in strengthening the ASEAN Specialized Meteorological Centre with emphasis on its ability to monitor forest and land fires and provide early warning of trans-boundary haze.
 29. Reduce health risks from environmental pollution and hazards.
 30. Develop national norms and standards for the prevention and control of environmental health hazards.
 31. Formulate a solid waste management master plan and guidelines and priority on big cities.
 32. Enact a hazardous waste law.
 33. Encourage more interaction with international bodies to obtain information and knowledge about environmental toxicity of chemicals, their assessment and risk reduction programmes.
 34. Educate the public about the importance of *the* 1990 Pesticide Law and promote safe handling and use of pesticides.
 35. Facilitate exchange of information on POPs.
- Activities to be completed within 15 years including on-going ones;
36. The government needs to facilitate increased research and studies on climate change qualitatively and quantitatively, and develop an information system on the subject.
 37. The government together with academics, and relevant scientific organizations, need to formulate a strategy and action plan to address the water related issues.
 38. The industries need to reduce their energy consumption, increase their overall process efficiency, and specifically reduce their greenhouse gas emissions.
 39. Cooperate in the establishment and implementation of ASEAN Regional Research and Training Centre for Land and Forest Fire Management.

3.1.5 Sustainable Management of Land Resources (Environmental perspective)

Lead Institution

Ministry of Agriculture and Irrigation

Collaborating Institutions

Ministry of Forestry and related departments, agencies and NGOs.

Overview

Land is owned by the State. The Dry Zone is the most problematic region in terms of degradation of land resources due to past continued deforestation in addition to its severe climatic conditions. The Dry Zone Greening Department of Ministry of Forestry is responsible for greening 13 Districts in central dry zone of the country which covers 12 percent by area and 20 percent by population of the whole country (NCEA 1997). Hill side

farming techniques were largely demonstrated in mountainous areas especially in border regions where shifting cultivation still prevails. Some of these areas were transformed into terraces since 1963-64 and about 26,000 hectares have since been terraced (NCEA 1997). Myanmar is a member of the International Centre for Integrated Mountain Development (ICIMOD) along with Afghanistan, Bhutan, India, Nepal, Bangladesh, China and Pakistan.

The rapid development of the agriculture sector during recent years, the growing population, the huge extension of urban areas and industrial sites, together with the nationwide construction of highways and railroads, bridges, dams, airfields, poses a great threat to the country's land resources as well as to the environment. A well defined land use policy is needed to resolve conflicts between forestry, agriculture, fisheries, mining, industries and local communities.

Land degradation is a significant environmental problem. Land degradation is caused by several factors including deforestation, excessive application of farm chemicals, inadequate management of soil quality and improper irrigation. Soil erosion by water is the most pervasive form of land degradation. In Myanmar soil erosion by water is 3.1% of all land, terrain deformation by water erosion affected 6 million ha and wind erosion affected 0.4 million ha (ASEAN SoE 2000). Excessive use of agricultural chemicals can contaminate soil and agricultural produce. Pollutants in contaminated soil can find their way into groundwater aquifers and surface waters, and

Rationale

Land resources are useful in many ways. Land degradation leads to a significant reduction of the productive capacity of land. Human activities are contributing to land degradation, including unsustainable agricultural land use, poor soil and water management practices, deforestation, removal of natural vegetation, overgrazing, and poor irrigation practices. Soils are important natural resource and it is important to conserve soil fertility and to improve degraded soils. Desertification is land degradation in arid, semi-arid, and dry sub-humid areas. The most obvious impact of desertification is decline in soil fertility. Therefore, the real problem that needs to be addressed is soil degradation, that is, the way good land slowly becomes less and less fertile.

Objective

To strengthen land use policy, preventing land degradation and desertification

into the ecosystems through food chains. Chemical residues on agricultural produce can be harmful to human health. Myanmar imported pesticides worth \$11,500,000 and fertilizers worth \$53,805,000 in 1998 (ASEAN SoE 2000).

Competition for land use necessitates integrated approach to the planning and management of land resources. The prevailing land use conflicts necessitate a clear cut land use policy in Myanmar. A body like "National Land Use Commission" is needed (NCEA 1997) for the efficient management of land resources in general and clarification of different land uses, scientifically categorized in the interest of the country in particular.

With specific objectives and activities, Myanmar Agenda 21 identified three programme areas, namely:

1. *Strengthen Policy, Planning and Management Systems;*
2. *Prevent Land Degradation and Desertification; and*
3. *Promote Integrated Mountain Development.*

This is an increasing problem affecting a quarter of the land area of the planet and a billion people and is caused by climate change, drought and mismanagement (Peace Child International 1994). In mountainous regions earth exposed in the wake of deforestation is washed away by rain. New trees find it hard to grow in the remaining soil. Poverty is a major factor in soil degradation. And it is needed to restore fragile and degraded lands. Immediate actions are needed to resolve issues, namely, soil erosion and degradation in the mountainous areas and dry zone; salinity problem occurring in delta and coastal areas; alkalinity problems in dry zone; and acidity problem in some laterite areas.

and promoting integrated mountain development.

Activities to be completed within 5 years including on-going ones;

1. Adopt a well-defined or clear-cut land use policy aiming at sustainable development and ensuring environmental sustainability.
2. Formulate an integrated land use plan that takes into consideration national priorities and goals based on scientifically categorized different land uses.
3. Establish National Land Use Commission.
4. Try to attain extraordinary rise in land productivity, combined with the modest expansion of cultivated area.
5. Review and strengthen laws and policies, rules and regulations concerning land resources to promote sustainable land resources management and to avoid overlaps and jurisdictional conflicts.
6. Practice EIA on conversion of land resources.
7. Increase knowledge of desert and mountain ecosystems and identify areas most at risk from floods, soil erosion, etc.
8. Encourage organic farming, utilization of farmyard manures, bio-fertilizers such as

rhizobium, effective micro organisms (EM), etc.

9. Develop appropriate sustainable farming systems such as SALT, practicing appropriate cropping pattern, and take measures to implement them.
10. Encourage practicing proper water management in dry zone.

Activities to be completed within 10 years including on-going ones;

11. Prevent desertification by not polluting soil, by proper land use and by planting of trees that retain water and soil quality.
12. Give rural people and farmers environmental education.
13. Encourage environmental and biodiversity conservation programmes along with livelihood inputs in mountainous areas.
14. Collaborate more with Himalayan countries to promote integrated mountain development.
15. Share experiences among ICIMOD countries on sustainable livelihood of local communities and poverty reduction ensuring environmental sustainability.

3.1.6 Sustainable Management of Coastal, Marine and Island Ecosystems (Environmental perspective)

Lead Institutions

Ministry of Defense, Ministry of Forestry, Ministry of Livestock and Fisheries

Collaborating Institutions

Ministry of Transport, Ministry of Education, and related departments, agencies and NGOs.

Overview

Coastal, island and marine ecosystems are all inter-dependent and at the same time are having various issues but an integrated approach to problem solving is generally lacking. The coastal line of Myanmar is 2229 km. There are more than 800 small islands in Myeik Archipelago along with abundant coral reefs. The coastal and marine living resources of Myanmar are very important for economic and social development of the country. The number of marine species is 351 fish species; 27

mangrove species; 9 sea grass species and 67 scleractinia coral species (ASEAN SoE 2005). According to surveys made in 1980s, the maximum sustainable yield could be safely estimated at a little over a million metric ton, and if sustainably utilized, they offer increased potential to meet nutritional and social needs (NCEA 1997). The Fisheries Department, Ministry of Livestock Breeding and Fisheries is responsible for sustainable fishery management. The Department deals with the

private sector, both local and foreign companies for fisheries operation. Myanmar fishery production has been continuously rising since 1990s but is still below the maximum sustainable yield. However a study in 1995, in Bogalay Township, revealed that fishery production was affected by mangrove destruction. In the Ayeyarwady Division in recent years, fish and fishery products are becoming scarce and the prices of fish, shrimp as well as other products such as dried fish, dried prawns, and shrimp pastes have risen sharply (NCEA 1997). The Laws enacted for fishery production and protection include the Fishing Rights of Foreign Fishing Vessels of 1989, the law relating to Aquaculture of 1989, the Myanmar Marine Fisheries Law of 1990, and the Freshwater Fisheries Law of 1991. These laws strengthen and promote sustainable development of fishery sector including foreign fishing vessels are given the right to fish only in exclusive economic zone and joint venture fishing vessels are given the right to fish only in territorial waters. Myanmar acceded to the Agreement to promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas in 1994, the United Nations Convention on the Law of the Sea in 1996 and the International

Rationale

Marine living organisms are entirely dependent on the sustainability of the coastal mangroves and other forest resources. These resources not only serve as supply of bio-fuel and forest products but also serve as breeding ground and shelter and a source of detritus for living organisms. These coastal and island forests or ecosystems also provide environmental protection functions such as tsunami, bank erosion protection, windbreaks, and from salt intrusion. Consequently, coastal and marine ecosystems should be accorded high priority for conservation. Fish plays key roles for human food supply and aquatic ecosystems. *The main pressures include fisheries, coastal development and pollution loads based from land-based sources, maritime transport, and marine dumping.* This affects both freshwater and marine fish stocks and habitats and has consequences for biodiversity and for the supply of fish for consumption and other uses.

Convention for the Prevention of Pollution from Ships in 1988.

With specific objectives and activities, Myanmar Agenda 21 identified three programme areas;

1. Strengthen Sustainable Use of Coastal and Marine Living Resources,
2. Promote Environmental Conservation and Integrated Management of Coastal Resources and Areas,
3. Promote Effective Management of Island Ecosystems.

In Myanmar, fish production is still relatively untapped, having vast potential for further development. Of the maximum sustainable yield of 1.5 million metric ton of fresh water fishery and 1.05 million metric ton of marine fishery, at present only 80 percent of fresh water fishery and 131 percent of marine fishery is being tapped (MNPED 2006b). Myanmar's food security programme gives priority on expanding the production of agriculture, livestock and fishery for self-sufficiency and the surplus for export (MNPED 2006a). The sustainable management of fish resources has become a major concern with continual growth in fish catches in Myanmar.

Oceans are under increasing stress from pollution, over-fishing and general degradation. It affects everything from the climate to coral reefs. Our seas are under intense pressure from pollution, most of which comes from human beings. According to global Agenda 21, in the year 2020, three quarters of us will be living 60 km (40 miles) from a coastline. If there is no change in human behaviour more people will be pouring sewage and waste into the seas. The global Agenda 21 says, 600,000 tons of oil is junked into the sea by ships every year as a matter of course. Many of the fish caught are unfit to eat, still huge, mile-long drift nets are being used that sometimes catch dolphins and other things that humans don't need. Over-fishing means worldwide fish catches are dropping.

Within the framework of the FAO Code of Conduct for Responsible Fishing, plans are being made to address the issue of illegal,

unreported and unregulated fishing (OECD 2001). According to Global Agenda 21, nations must commit themselves to control and reduce the pollution of the marine environment and

maintain its life support capacity. People have to stop thinking of our seas having unlimited coastal and marine resources.

Objective

To enhance conservation of coastal, marine and island ecosystems and sustainable harvesting of marine living resources.

Activities to be completed within 5 years including on-going ones;

1. Protect and check environmental damage to coastal areas of Myanmar.
2. Stop fishing for species at risk until they are restored to their normal numbers or status.
3. Ban destructive fishing practices—dynamiting, poisoning, electrocution, and using unauthorized fishing methods and gears; develop new practices to replace them.
4. Constantly patrol and encourage research and long-term monitoring of unauthorized fishing.
5. Prepare a strategy for sustainable management of island ecosystems.
6. Establish a coastal and marine research centre using universities of marine science as a nucleus.
7. Prevent encroachment and settlement on the islands of Myeik Archipelago.
8. Adopt polluters pay policy and reward those using cleaner methods.

Activities to be completed within 10 years including on-going ones;

9. Cooperate with ASEAN countries in the development and implementation of a regional Action Plan for the Protection of the Marine Environment from Land-based and Sea-based Activities.

10. Protect marine life by controlling what materials may be removed from ships at sea and by banning removal of hazardous waste.

11. Promote international cooperation *in* sharing technologies.

12. Assess the potential of marine and coastal living resources including unutilized stock and species and undertake studies on sustainable yields of different fish species.

13. Set limit based on maximum sustained yield of fish.

14. Encourage artisanal fishing practices.

15. Strengthen fisheries laws enforcement and enhance education and awareness programmes.

16. Establish a coastal and marine research centre using universities of marine science as a nucleus.

17. Cooperate with ASEAN countries in the development and implementation of a regional Action Plan for the Protection of the Marine Environment from Land-based and Sea-based Activities.

18. Cooperate with ASEAN countries in developing and improving regional coordination for the integrated protection and management of coastal zones.

19. Participate actively in the ASEAN working group on coastal and marine environment.

20. Collaborate and cooperate with Bay of Bengal Large Marine Ecosystem (BOBLME) Programme for sustainable development of the coastal area and marine environment.

3.1.7 Sustainable Management of Eco-Tourism (Environmental perspective)

Lead Institution

Ministry of Hotels and Tourism, Ministry of Forestry

Collaborating Institution

Ministry for Progress of Border Areas and National Races and Development Affairs,

Ministry of Information, Ministry of Culture, and related departments, agencies and NGOs.

Overview

Agenda 21 identified two programme areas with specific objectives and activities namely, *1. Strengthen Infrastructure for Sustainable Tourism Development, and 2. Enhance Ecotourism*. In view of the goal of developing ecotourism, it should concur with 'Environmental and Natural Resource Conservation and Management'.

Tourists arrival in Myanmar was 416,000 in 2000; 475,000 in 2001; 487,000 in 2002; 597,000 in 2003; 657,000 in 2004; 660,000 in 2005; and 630,000 in 2006 (MOHT 2006). In its 30-year national development plan, the Forest Department emphasizes promotion of ecotourism to generate more foreign exchange. There are 15 ecotourism sites prescribed by the Ministry of Forestry, namely, Hlawga Wildlife Park, Yangon Zoological Garden, Moeyingyi Wetland Wildlife Sanctuary, Mainmahlakyun Mangrove Wildlife Sanctuary, Inlay Wetland Wildlife Sanctuary, Shwesettaw Wildlife Sanctuary, Popa Mountain Park, Alaungdaw Kathapa National Park, Chatthin Wildlife Sanctuary, Natmataung National Park, National Kandawgyi Gardens, Kakaborhazi National Park, Seinye Forest Camp, Indawgyi Wetland Wildlife Sanctuary, and Myainghaywun Elephant Camp. Major ecotourism sites of ASEAN member countries include Mount Popa National Park (Popa Mountain Park), Natmataung National

Park, Moyingyi Wetland Wildlife Sanctuary, Pyin Oo Lwin Botanical Garden (National Kandawgyi Gardens), and Yangon Zoological Garden (ASEAN SoE 2000). Opportunities for ecotourism for each protected area should be clearly defined by recommending specific activities for each protected area. For promotion of ecotourism, the following prerequisites are important, namely, there should always be undisturbed natural setting, infrastructure or facilities for visitors to be built in harmony with nature without or with least disturbance to the environment, if possible to use materials available around; part of the income generated from ecotourism activities should go to park development; ecotourism should promote community involvement and at least encourage income generation of the people living in and around protected areas; ecotourism routes or journeys should provide the visitors for viewing wildlife, natural forests, landscapes, cultural sites and viewing ethnic people along with their cultures; nature-based tourism should be mingled with culture-based tourism in Myanmar. The Myanmar Hotel and Tourism Law was promulgated in 1993. It prescribes that the hotel and tourism industry shall not cause damage to or destruction of cultural heritage and natural scenic beauty of Myanmar.

Rationale

Myanmar has varied ecosystems ranging from snow capped mountains, rivers, natural big lakes, dense forests, long sandy beaches, various species of both flora and fauna. That is why most tourists visit it for its pristine beauty, pleasure, holidays and sightseeing. Taking environmental protection into considerations, efforts are being made to promote ecotourism. Ecotourism in essence, is to minimize negative environmental impacts (Orams 1995) and to provide income generation to local community sufficient for local people to value and

therefore protect their natural and wildlife areas as a source of income (Goodwin, 1996).

Increasing recognition is being given to the value of ecotourism in Myanmar. Nowadays protected areas in Myanmar are viewed as a focus for nature-based tourism or ecotourism, rather than as a focus for biodiversity conservation. Ecotourism activities should be incorporated into rural development to get local guardianship of protected areas. The unbalanced distribution of visitors, both spatially and seasonally, may generate

environmental problems. The use of non-biodegradable materials and lack of proper solid waste disposal systems, littering in ecologically sensitive areas may lead to serious environmental problems along with consequent hazards to health. Water contamination arising from improper refuse disposal systems and location of toilets close to water sources may affect human health. The most important point is under any circumstances, our good, undisturbed and unspoiled natural areas shall never be spoilt in the name of misinterpreted ecotourism activities. Ecotourism can be an important source of funding for conservation activities. It is important to develop a clear and workable national policy on ecotourism to address key issues that ecotourism entails, including identification of sensitive areas, environment and social impacts of tourism

activities, and the equitable distribution of economic benefits from tourism activities.

Having some of Asia's richest biological diversity and one of the highest levels of species endemism, Myanmar has tremendous potential for developing ecotourism or nature tourism, which will complement the attractions from religious and historical sites. This can be done by ensuring ecotourism elements are included in park management plans; demarcating a suitable area for tourism in buffer zones or periphery areas of parks; deciding in advance the style and scale of appropriate tourism development in each area; ensuring that park objectives are paramount when planning for ecotourism; and ensuring the needs of local communities are taken into account when planning for ecotourism.

Objective

To promote sustainable eco-tourism development

Activities to be completed within 5 years including on-going ones;

1. Introduce conservation awareness and environmental education into the syllabus of tourism related courses conducted by the Ministry of Hotels and Tourism and other relevant ministries.
2. Develop an ecotourism policy.
3. Train FD and NWCD staff to understand the essence of ecotourism as well as the needs of ecotourism operations in order to make ecotourism works for conservation.
4. Include visitor programmes with conservation issues to promote conservation awareness rather than just facilitating recreational activities.
5. Allow and encourage private tour operators to undertake day to day ecotourism activities abiding by the rules and regulations of the parks.
6. Ensure safety and security of eco-tourists especially for adventure activities.

Activities to be completed within 10 years including on-going ones;

7. Integrate tourism with local communities, based on careful sociological studies carried out beforehand.
8. There should be fair competition among respectable parties and the monopoly of ecotourism business must not be allowed in ecotourism sites.
9. Choose potential ecotourism sites taking into consideration the potential of Myanmar's protected areas as attractions, and integrate with park planning and management.
10. Assess the tourism potential in each protected area such as Alaungdaw Kathapa National Park, Popa Mountain Park, Moeyingyi Wetland Wildlife Sanctuary, Inle Wetland Wildlife Sanctuary, Shwesettaw Wildlife Sanctuary, Chatthin Wildlife Sanctuary, Namataung National Park, Lampi Marine National Park, Kakaborhazi National Park, and Bago Yoma Crossing.

Coordinate with relevant departments and organizations, the private sector, either of a formal or informal nature, whereby the needs of the various departments and relevant organizations concerned with tourism in protected areas can be discussed.

3.1.8 Sustainable Management for Mineral Resources Utilization (Environmental perspective)

Lead Institution

Ministry of Mines

Collaborating Institution

Ministry of Science and Technology, Ministry of Health, NCEA and related departments, agencies and NGOs.

Overview

With an aim to providing raw materials for heavy industries and promoting exports, efforts are being made for the development of the mining sector. For the Year 2005/2006 (end of March), the production of gold was 22949 Troy oz; refined copper was 28161 M-T and pig iron was 3520 M-T (MNPED 2006b). Regarding solid waste disposal methods, in Myanmar generally, open dumping method is being practiced and controlling tipping is partly practiced in Yangon, sanitary landfill and informal recycle and recovery method are being practiced (ASEAN SoE 2000). Regarding methods of disposal of municipal solid waste, composting 5%, open

dumping 75%, land filling 10% and other methods 5% are being used (ASEAN SoE 2005). In Myanmar, the city development offices have been charged with waste management.

With specific objectives and activities, Myanmar Agenda 21 identified two programme areas:

1. *Upgrade facilities for environmentally sound mining and mining processing operations,*
2. *Rehabilitate and reclaim degraded areas from mining and mineral processing operation.*

Rationale

57 percent of the country has been geologically mapped to assist countrywide mineral prospecting and exploration (NCEA 1997). The country has a rich potential for further development of mineral resources especially copper, gold, lead, zinc, silver, tin, tungsten, nickel, iron, coal, dimension stones, gemstones, and jade. Myanmar Oil and Gas Enterprise in collaboration with foreign companies carried out on-shore and off-shore exploration and extraction of crude oil and natural gas. The

development of mineral resources has great impact on environmental quality. The Myanmar Mines Law, 1994, has some provisions for environmental protection including, among others, to protect the environmental conservation works that may have detrimental effects due to mining and there are restrictions for the holder of the mineral production permit, to refrain from any activities which may have detrimental effects to the public.

Objective

To enhance environmentally sound mining and mineral processing operations and to incorporate environmental safeguards

Activities to be completed within 5 years including on-going ones;

1. Introduce EIA during exploration works.

2. Undertake a few pilot projects for protection, rehabilitation and reclamation of mining areas.
3. Use clean technologies in new concession areas, and upgrade and seek cleaner

production technologies in cooperation with countries in the region.

4. Upgrade technical skills of those involved in mining operations.
5. Assign experts for effective monitoring system.
6. Identify appropriate locations of solid waste management.

Activities to be completed within 10 years including on-going ones;

7. Prepare guidelines for EIA and risk assessment.
8. Identify environmentally critical and sensitive areas.
9. Formulate and implement environmental quality and effluent standards for mining operations
10. Introduce and impose compensation or rehabilitation fees and establish guaranteed funds for reclamation of degraded areas.
11. Undertake effective measures against contamination of water sources.

12. Prevent off-site contamination.
13. Adopt proper management of toxic and hazardous wastes.
14. Prepare a comprehensive action plan for rehabilitation and reclamation of already destroyed mining areas.
15. Promote environmental safeguards.

Activities to be completed within 15 years including on-going ones;

16. Include comprehensive risk assessment as a part of environmental impact assessment system and requirement for mining operations.
17. Build up technical capacity of mining officials and personnel in the areas of environmental management, environmental impact assessment and risk assessment.

Ensure that the mining does not destroy or limit other land use options and that there is post-mining land use.

3.1.9 Sustainable Management of Agriculture, Livestock and Fisheries (Environmental perspective)

Lead Institution

Ministry of Agriculture and Irrigation, Ministry of Livestock and Fisheries

Collaborating Institutions

Ministry of Forestry, NCEA, and related departments, agencies and NGOs.

Overview

At the national level, the fourth Short-Term Five-Year Plan spanning from 2006-2007 to 2010-2011, has been formulated (MNPED 2006b) with the main objectives including, among others, to expand new cultivable land for agriculture use; to drive for the substitution of lubricant oil and fuel oil by using bio-diesel oil; to enhance forest areas for greening; to conserve natural environment; and to exceed the targets of MDGs in implementing the national plans. The Ministry of Agriculture and Irrigation is responsible for expansion of land under agriculture use and construction of new

dams. Therefore environmental considerations should be paid due attention and be integrated into the ministry's objectives and action plans for the sake of sustainable agriculture. The guidelines of the Ministry of Agriculture and Irrigation are boosting production, expanding areas under agriculture, permitting private sector in the production of industrial crops, fruit trees, perennial crops and its involvement in the production of agricultural machinery and inputs. The Government has designated agriculture as the main pillar of the economy and tremendous efforts are made to achieve

greater progress in the agricultural sector. Myanmar, with an agro-based economy, the agriculture sector plays a dominant force in national economic development. It has significant role in providing overall domestic food self-sufficiency, promoting external trade and also providing raw materials to meet the domestic agro-based industries.

For the development of the agriculture sector, emphasis has been on ensuring self-sufficiency in rice, expanding cultivation of pulses and beans for export promotion and expanding cultivation of cotton, sugar-cane, oil seed crops, culinary crops such as chillies, onions, potatoes, coffee, tealeaf, pepper and physic nut which is bio-diesel plant (MNPED 2006b). With an aim to expanding cultivable land, private entrepreneurs and companies are allowed to reclaim vacant and fallow land, virgin land and wetlands (MNPED 2006b). Up to September 2006, 0.7 million acres have been claimed out of the permitted 2.4 million acres, and 0.3 million acres are under cultivation (MNPED 2996b). Up to September 2006, there were 664 dams and reservoirs and 5.52 million acres had been irrigated (MNPED 2006b).

Rationale

Agriculture plays a crucial role in the economy of most developing nations and is the mainstay of Myanmar's economy. Sustainable agriculture requires the integration of environmental considerations with agricultural policy analysis and planning. Myanmar is basically an agricultural country with about 75 percent of the population residing in rural areas. As population increases more rapidly than expansion of arable land, there is increasing environmental pressure on arable lands. As our country, is aiming at boosting production of palm oil, rubber and sugar in order to promote food security, the security of permanent forest estates such as reserved forests are being challenged and thus sustainable forestry is becoming a major environmental issue. Agricultural production requires good environmental management to ensure sustainable production without significant environmental consequences. The fisheries

Myanmar Agenda 21, with specific objectives and activities, identified two programme areas, namely, *1. Promote Sustainable Agriculture, Livestock and Fisheries Development and 2. Enhance Food Security and Prewarning Systems.* Myanmar's economy is market-orientated and is increasingly integrated with the global economy. Agricultural production has increased through expanding arable land and increasing farm productivity. Malaysia and Indonesia are the major producers and exporters of palm oil, Malaysia and Thailand are the major producers of rubber and Thailand and the Philippines are the major sugar producers among ASEAN countries. Intensive prawn farming often destroys mangrove forests (which are essential fisheries nurseries) and causes serious water pollution and other problems. Sources of agriculture wastes are from fertilizers, pesticides and animal farming. Agricultural activities that are major sources of pollutants include pig farming, fish and prawn farming. Pig farming, when concentrated in a limited area, can cause serious water pollution. Effluents from prawn farms and fish ponds carry high BOD loads and could seriously pollute receiving waters.

sector is important in Myanmar's economy as fish constitutes a major source of animal protein in the diet of majority of the people. There is much potential for the development and expansion of the country's fisheries within Myanmar's waters as well as in the exclusive economic zone. Inland water bodies such as lakes, reservoirs, rivers, ponds, with annual heavy rainfall, result in a fertile delta region and the formation of freshwater flood fisheries. Livestock are an integral part of the agricultural economy and provide almost all the draft power and rural transport. Future agricultural expansion would also require an increase in the production of draft animals. Potential also exists for breeding dairy cattle to enhance quality dairy products. Pasture lands are essential and their security should be guaranteed. Pasture land use must not be converted into other less valuable land uses.

Objective:

To enhance sustainable food security and security of forestry and pasture land uses.

Activities to be completed within 5 years including on-going ones;

1. Conduct environmental analysis as part of land use planning to ensure that environmentally valuable lands and sensitive areas are not encroached upon for agriculture expansion and thus avoiding adverse environmental impacts.
2. Stop unsustainable agricultural and other land uses leading to deforestation, soil degradation and desertification.
3. Monitor the use of chemical fertilizers and pesticides to prevent excessive overuse and soil and water pollution as well as destructive fishing practices.
4. Drive enforcement of law and order, rules and regulations in fisheries.
5. Promote protection of fisheries in sustainable development.
6. Conduct Research.
7. Provide community-oriented cost effective extension services generating grass-roots impact.
8. Introduce EIA prior construction of dams and agro-based industries and infrastructure.
9. Drive increased agricultural production by raising productivity on existing lands rather than through opening up of new lands (Vertical rather than horizontal approach should be adopted).
10. Strive for secured pasture land use.
11. Promote organic farming.

3.1.10 Sustainable Energy Production and Consumption (Environmental perspective)

Lead Institutions

Ministry of Energy, Ministry of Electric Power
(1)

Collaborating Institution

Ministry of Electric Power (2), Ministry of Science and Technology, NCEA, and related departments, agencies and NGOs.

Overview

In the fourth Short-Term Five-Year Plan (2006/2007 to 2010/2011) of the national 30-year development plan for the energy sector as well as the mining sector, it had been mentioned that environmental conservation should be paid attention while making concerted efforts to produce more crude oil and natural gas to meet domestic requirements and for export while boosting production of mining sector. However environmental consideration has not been mentioned in other sectors namely, agriculture, livestock and fisheries, industry, electric power, construction, transport, and communication.

Concerted efforts are being made to produce more crude oil and natural gas both for export and local consumption. 13 international oil companies are operating 33 projects on-shore and off-shore areas and due to efforts, the production of natural gas has increased to 402898 million cubic feet in 2005-2006 (MNPED 2006b).

With specific objectives and activities, Agenda 21 identified two programme areas; 1. Develop a system of comprehensive energy planning, development and management, and 2. Improve energy efficiency and energy conservation.

Two types of energy are found in Myanmar, namely, non-renewable energy – crude oil, natural gas, and coal; and renewable energy, namely, hydro energy, geothermal energy, solar energy, wind energy and biomass energy. The wealth of the country’s natural energy resources are hydropower, coal reserves and natural gas resources. Electricity is an important component of commercial energy. The potential for hydropower in Myanmar is great and initiations of medium and large scale hydropower projects are being undertaken. The

government has formulated the development of the natural gas reserves of the country and has signed contracts with multinational companies for exploration and development of gas fields.

To develop sustainable energy production and consumption, on the one hand, improving efficiency in production, minimizing wastage in production and distribution and, on the other hand, consumption of energy should be efficient and energy conservation should be developed.

Rationale

Energy is an essential driving force for achieving social and economic development and an improved quality of life. Energy development must be done in a way that respects atmosphere, human health, and the environment as a whole. According to the Ministry of Energy’s 30-year development plan, the country’s energy policy is to maintain the status of energy independence; to promote wider use of new and renewable sources of energy; to promote energy efficiency and conservation; and to promote use of alternative fuels in households. Consequently, the energy strategy is to develop all the available energy resources of Myanmar; to increase the production level of present existing energy

resources; and to continuously update the unsuppressed energy demands.

Energy is a major component of economies, both as a sector in itself and as a factor input to all other economic activities. Energy production and use have environmental effects. Fuel combustion is the main source of air pollution and greenhouse gas emissions and also it affects water quality. The need to control atmospheric emissions of greenhouse and other gases and substances must be based on efficiency in energy production, transmission, distribution and consumption. It is essential to integrate environmental dimensions in energy planning and development.

Objective

To incorporate environmental considerations in energy production and consumption

Activities to be completed within 5 years including on-going ones;

1. Integrate environmental concerns in the formulation of energy policies
2. Introduce EIA prior dam constructions for hydropower.
3. Encourage legislative change ensuring environmental considerations and mandating EIAs for hydropower projects as well as various development plans.
4. Strive to establish a balance between environmental protection and conservation and the meeting of energy needs in the country.

5. Develop hydropower resources in an economically viable and environmentally sound manner to support sustainable development efforts.

Activities to be completed within 10 years including on-going ones;

6. Increase use of environmentally sound new and renewable sources of energy such as solar, wind, hydro, and biomass energy.
7. Maintain environmental quality in energy development.
8. Strive to achieve sustainable energy development while meeting the country’s international obligations.

Encourage manufacture and propagation of commercially viable new and renewable energy sources through private sectors.

3.1.11 Sustainable Industrial, Transport and Communication Development (Environmental perspective)

Lead Institution

Ministry of Industry (1), Ministry of Industry (2), Ministry of Transport, Ministry of Rail

Transportation, and Ministry of Communications, Posts and Telegraphs

Collaborating Institutions

City Development Committees, Ministry for Progress of Boarder Areas and National Races

and Development Affairs, and relevant departments

Overview

Myanmar has high potential for industrial development because of its natural and human resources. The quality of labour in Myanmar is high and labour is available at low cost. Myanmar must achieve economic development while avoiding environmental hazards, pollution and degradation that have occurred in developed and industrialized countries. Present sources of industrial pollution are from various construction works and big and small industries which are located in all parts of the country. Some environmental pollution has occurred with the discharge of waste and effluent particularly by chemical plants. Little attention has been paid to industrial pollution control and waste management systems.

The total number of established factories increased to 81176 by the end of September 2006. In addition, since 1995/96, and up to 2005/2006 (end of March), altogether 18 industrial zones have been established in 9 States and Divisions, operating with a total number of 9849 factories and mills by the end of September 2006 (MNPED 2006b).

Transport is a major component of economic activity as it supports the social and economic development of the country but has many effects on the environment.

There were 745 bridges of over 180 feet in 1988 but 1149 bridges of 180 feet span by the end of September 2006, undertaken by Ministries of Construction, Railways and Defence and the union highways and main roads were extended to 58170 miles and total rail tracks were stretched to 4043 miles by the end of

September 2006 (MNPED 2006b). Airport construction and air navigation have impacts on the environment and can lead to human health and natural ecosystems. Run-offs from airport runways also affect water quality and soil contamination. Environmental considerations should be taken into account in the current air transport system, regarding flight routes, location and planning of airports and airfields. On the other hand, the development of airports and airfields is essential to opening up the country to the world markets. For improved transportation, the total number of airports was increased to 73, including 13 upgraded airports. For improved port services, the number of jetties increased to 32 and the number of container terminal is 5 and also there were 230 micro wave stations by the end of September 2006 (MNPED 2006b). The use of inland waterways is important to the development and livelihoods of the population and the country. As regards inland waterways, there were 6650 km of navigable inland waterways (MOT 2004). Most were capable of accommodating vessels year-round and as a traditional way of transportation, the inland waterway plays an important role. However the use and quality of these waterways have impacts on the environment as these waterways are connected to environmentally sensitive areas such as mangrove swamps and wetlands. Any contamination of inland waterways may affect not only the reservoirs and lakes but also to populations who rely on waterways as a source of drinking and household waters. In Myanmar, vehicle

emissions are a source of air pollution in urban areas. The vehicles on the roads are reconditioned vehicles from other countries, some being old, and not properly maintained. The common use of diesel oil and leaded petroleum adds to the environmental problems. In dry weather, earth and track roads all over the country contribute to dust pollution.

With specific objectives and activities, Myanmar Agenda 21 identified two programme areas;

1. Promote Sustainable Industrial Development and Cleaner Production and
2. Promote Sustainable Transport and Communications Development.

Rationale

Industrial development is essential for economic growth. It is essential for the production of goods and services and is a major source of employment and income. Industry is the means by which natural resources are exploited and the site selection of industrial activities can have effects on the population and on human health. Many large scale and polluting industries have been spread all over the country for economic and environmental reasons aiming at regional development. As the country develops its industrial sector, it is crucial that industrial development does not cause environmental degradation.

To maintain the present condition of the country and its environment, industrial development and planning must be integrated with environmental concerns. The transportation and communication sectors have an essential and positive role to play in economic and social development. Industrial development and the optimal use of a country's natural and human resources require the support of a reliable and extensive infrastructure of transport and communications. At the same time,

The industrialization process in Myanmar will depend on the use of a broad spectrum of chemicals, metals, petroleum, and other resources which will generate hazardous waste. Unless measures are implemented to collect and treat such waste it can pose hazards to human health. Some environmental pollution has occurred with the discharge of waste and effluent particularly by chemical plants. In 1997, industrial organic water pollutants of Myanmar was primary metals, 11.4%; paper & pulp, 6.8%; chemical industry, 29.6%; food & beverages, 18.5%; stone ceramic & glass, 1.5%; textiles, 3.9%; wood, 27.1%; and others, 1.2% (ASEAN SoE 2000).

transportation can be a source of pollution. Structures and systems for transport and communications can adversely affect environmentally sensitive areas and habitats. Transportation and communications require energy consumption, and cause pollution through exhaust emissions, noise pollution, impacts on land and water quality, soil contamination, and visual intrusions that have effect on human health, senses, comfort, natural ecosystems and the quality of life. Further development and improvement of waterways, roads and rail transport should be conducted bearing in mind the effect on the environment and ecosystems. Dredging activities remove fauna in river beds, increase turbidity and may lower oxygen levels or cause re-suspension of contaminated sediments, affecting aquatic life. Dredging in coastal rivers and coastal areas also increase the salt-wedge intrusion, affecting fresh water aquifers.

Coastal shipping is important and at the same time marine ecosystems around Myanmar's coastline are affected by waste discharges from ships and other hazards.

Objective

To incorporate environmental considerations in Industrial, Transport and Communication Development

Activities to be completed within 5 years including on-going ones;

1. Contact countries in the region which have been successful in maintaining environmental quality while they progress, as Myanmar pursues sustainable industrial development.
2. Encourage the production of green products that are recyclable or which are made from recycled materials.
3. Promote the establishment of waste treatment infrastructure and facilities.
4. Avoid site selection of industrial zones at environmentally sensitive areas and habitats.
5. Undertake legal reforms to comply with international commitments.
6. Prepare a broad-based development strategy for ports and waterways.
7. Take measures for the protection of marine environment, and promote the safety of shipping, navigation and crew.
8. Take measures to minimize the adverse environmental impacts from the expansion of road traffic and rail traffic.
9. Undertake regular monitoring of urban environmental air quality.

10. Participate in the activities of relevant international organizations.

Activities to be completed within 10 years including on-going ones;

11. In implementing industrial development strategies, include a cleaner production strategy which should focus on impacts along the entire life cycle of a product, from raw material extraction to the ultimate disposal of the product.
12. Introduce EIA prior transport and communication development programmes, such as development of major airfields and airports.
13. Encourage industrial technology and environmental management.
14. Introduce EIA prior industrial developments.
15. Prescribe standards and systems for industrial pollution control and waste management.

Activities to be completed within 15 years including on-going ones;

16. Prepare an air transport master plan.

Reduce energy consumption of industries, increase their overall process efficiency, and especially reduce their greenhouse gas emissions.



3.2 GOAL 2: INTEGRATED ECONOMIC DEVELOPMENT

After regaining independence in 1948, Myanmar was predicted to be a leading country in the regional economies. The ray was because of being previously a principal exporter of rice in the world, its abundant and untapped natural resources, favourable land-man ratio, and absence of population pressure. As well, the high potential of human resources with relatively towering literacy rates and education attainment were considered to be on a par with other Asian countries.

During the parliamentary democracy period, particularly from 1948 to 1962, the government pursued state-led industrialization as an attempt to establish an industrialized country. Unfortunately, the aim to promote industrialization was did not materialize due to over-emphasis on industrial sector expansion

and relative ignorance of primary sector development including agriculture. Likewise, under the Socialist Period during 1962 to 1988, ignorance of market mechanism, misallocation of scarce resources, less efficient production, and shortage in foreign exchange resulted by closed market led to the failure of the planned economy.

After 1988, the economy was designed to follow a market oriented one. Successive economic reforms were made to correct the stagnated economy, and permission for private sector participation, initiation of foreign investment, and creating rooms for international trade were also carried out as part of the reform agenda. Comparative achievements could be proved in areas such as the increase in hundreds of dams and the

widespread construction of road and rail networks. But it still lacks a certain framework for sustainable development.

This is the time to carry out integrated economic development in Myanmar to catch up with international and regional development trends which were significantly upward. At this point, integrated economic development means incorporating economic growth and

sustainability. Economic growth refers to increases of economic outputs whereas sustainability suggests up-holding the rise all the time. Thus integrated economic development could derive from balancing growth and sustainability. Critical aspiration of integrated economic development is sharing the fruits not only for present needs but also for future generations.

3.2.1 Reasonable Macroeconomic Performance

Lead Institution

Ministry of National Planning and Economic Development.

Collaborating Institution

Remaining Ministries and Institutions.

Overview

Macroeconomic performances are basically necessary conditions to attain sustainable development. On the other hand, macroeconomic instabilities such as high inflation, lower growth, high rate of unemployment, unreliable monetary system, uncontrollable fiscal deficit, and huge deficit in balance of payment are fundamental impediments for such development. Myanmar has an achievement of increased economic growth. During the stabilization programme period, 1989/90 to 1991/92, the economy was revitalized and registered an average annual growth rate of 5.9 per cent. GDP growth rates of short-term plan periods of 1992/93 to

1995/96, 1996/97 to 2000/2001, and 2001/2002 to 2005/2006 were also remarkable at the rate of 7.5 per cent, 8.5 per cent, and 12.9 per cent respectively (MNPED 2006, December). Be that as it may, these growth rates are similar to High Performing Asian Economies (HPAEs). In fact, GDP growth rate alone is not enough to praise macroeconomic performances. Every economy aims to achieve not only a high growth but also other positive statuses including price stability, naturally full employment, and favourable external trade. Accordingly, Myanmar's endeavour is to support reasonable macroeconomic performances.

Economic Growth

Rationale: Economic growth refers to the acceleration of national output or income. GDP alone cannot substitute average living standard but GDP per capita can do it. Indeed growth is not enough but highly necessary condition for sustainable development. Currently, the economy of Myanmar is at the developing and transitional stage to the market-oriented one. In addition, Myanmar economy is heavily dominated by agriculture. Thus, thrusting agricultural sector development is a compulsory

course of action for economic growth plus capital accumulation in marching to the industrialization. Additionally, agricultural sector promotion could raise overall standard of people living in the rural area and could contribute to poverty reduction.

Objective: To assure development of agriculture as the base and all-round development of other sectors of the economy as well.

Activities

1. Set the mainstay of the economy with the other sectors in accord with the economic objectives of the State – *a.* Development of agriculture as the base and all-round development of other sectors of the economy as well, *b.* Proper evolution of the market-oriented economic system, *c.* Development of the economy inviting participation in terms of technical know-how and investments from sources inside the country and abroad, and *d.* The initiative to shape the national economy must be kept in the hands of the state and the national peoples.
2. Focus on achieving consistent development of agricultural sector in line with the four policy guidelines; to permit agricultural production freely, to expand agricultural land and safeguard the rights of farmers, to permit economic production of industrial crops, fruit trees and perennial crops in the private sector, and to permit participation of the private sector in the production of agricultural machinery and input.
3. Encourage the establishment of agro-based industries with other required industries as the first phase.
4. Encourage the development of electric power and energy sectors for building industrial nation.
5. Expand the production of agriculture and livestock and fishery for self-sufficiency and then export promotion and provision raw materials to industrial sector.
6. Implement reforestation works and greening of dry zones.
7. Improve health and education services for human resource development.
8. Develop rural areas through five main national-level tasks; securing smooth and better transportation in the rural area, availability of water in the rural areas, uplifting of the education standard of rural people, uplifting of health-care system for the rural people, and development of the economy in the rural areas.
9. Maintain the solid economic and financial foundations of the State by allowing extensive participation in banking and financial activities by the co-operative and private sector.
10. Undertake supported measures to increase domestic investments by mobilization of internal and external financial resources within the policy frame work.

Performance Indicators

- Sectoral Production in Real Term
- Real GDP Growth Rate
- Per Capita GDP in Real Term
- Per Capita GDP in PPP
- Investment to GDP Ratio

Price Stability

Rationale: Price instability consists of both rise and fall of general prices. Sustained rise in general prices refers to inflation and fall in general prices refers to deflation. Unacceptable inflation drives down aggregate demand and deflation discourages aggregate supply. Both of them are undesirable to sustain economic development. In Myanmar, the rates of inflation at the beginning and end of 2001/02 to 2005/06 four-year plan were 25.18 per cent and 21.13 per cent. It stood at 3.76 per cent in March 2005, but it rose again and was 16.4 per cent in September 2006 (MNPED 2006, December).

Objective: To pledge stabilization of general price level especially pulling down high inflation rate and maintaining the stability so that mild inflation stage is not surpassed.

Activities

1. Make efforts to provide more goods and services by promoting economic growth so that supply will meet demand, and general price will be maintained at a reasonable range.
2. Apply monetary and fiscal policy so that money supply is adjusted with national output.

3. Improve tax administration to ease fiscal deficit as well as unnecessary panic buying especially in the real estate sector.
4. Encourage establishment of public companies and initiate stock exchange so that people's savings and capital in speculation will flow into productive areas.
5. Establish clean government so as to minimize transaction costs including

corruption which reinforces cost-push inflation.

Performance Indicators

- Consumer Price Index (CPI)
- Producer Price Index (PPI)
- Growth in Money Supply
- Currency in Circulation and Demand Deposit to GDP Ratio (M_1/GDP)
- $M_1 +$ Time Deposit to GDP Ratio (M_2/GDP)

Employment Opportunity

Rationale: For the growing human resources, appropriate employment creation is very important to absorb surplus labour force. It is also crucial in employment creation where underemployment so-called disguised unemployment situation is usually seen in many developing countries especially in the public sector and agriculture. Even though the economy continues to grow, jobless-growth is undesirable. So, economic growth should be consistent with explicit job creation. Since long-term and high unemployment tends to create socio-economic instability and political turmoil, formation of new employment opportunities should be intentionally emphasized in every economy.

Objective: To guarantee efficient and effective employment creation so as to augment living standard of entire people.

Activities

1. To regulate systematic development of industries, issue a number of laws including Union of Myanmar Foreign Investment Law of November 1988, The State Enterprises Law of March 1989, Notification No.1/89 of May 1989 specifying types of economic activities allowed for foreign investment.

2. Resituate small and medium-size enterprises (SMEs) establishment and promote cottage industries with The Private Industrial Enterprise Law of 1990, The Promotion of Cottage Industries Law of 1991.
3. Encourage private sector participation in the manufacturing sector promotion through relaxation of restrictions on private investment with issuance of The Myanmar Citizen Investment Law of 1994.
4. Establish eighteen industrial zones under the supervision of Myanmar Industrial Development Committee (MIDC).
5. Encourage business establishment by providing incentive of exemption from income tax for three consecutive years from the year of commencement of business.
6. Seek by Department of Labour for job opportunities in cooperation with local as well as overseas employment organizations.

Performance Indicators

- Unemployment Rate
- Employment Creation Rate

International Trade

Rationale: International trade has often played a crucial role in the historical development of advanced countries as well as HPAEs. However, throughout developing countries, primary product exports have traditionally accounted for a sizable proportion of individual gross national products. Most parts of their imports

have also been consumer goods. For sustainable development, export and import so-called international trade structure needs to improve, i.e. from primary product export dependence to industry product and service export, and from more import of consumer

goods to more import of capital and intermediate goods.

Objective: To encourage exports in order to promote foreign exchange earnings as well as to have the benefit of favourable trade balance, and give priority to import capital/ intermediate goods and essential consumer goods.

Activities

1. Practice independent foreign trade policy.
2. Enjoy the benefit under Generalized System of Preference (GSP) to some extent.

3. Enjoy special benefits under ASEAN Free Trade Area (AFTA) and Common Effective Preferential Tariff (CEPT) Scheme.
4. Make effort for the development of foreign trade particularly for export promotion.
5. Encourage the extensive participation of private sector in external trade.

Performance Indicators

- Terms of Trade
- Structure of Exports
- Structure of Imports

Table 1: Medium-Term Projection for Economic Growth

	Base Year	Projection (percentage change)				
	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
GDP (in constant price)	13.2	12.0	11.7	12.1	12.1	12.3
- Agriculture	11.8	8.8	6.4	5.9	5.6	5.2
- Industrial Production	19.1	20.6	23.8	25.1	24.5	23.4
- Services and Trade	12.8	12.1	11.9	11.9	11.4	11.7

Recommendations

1. Structure of GDP should be improved together with growth of the economy.
 2. Exchange rate unification on a gradual basis is necessary to avoid mismanagement in State-owned Economic Enterprises (SEEs) and confusion in calculating national statistics, and also to attract inward foreign direct investment (FDI).
 3. Inflation needs to be reduced through prudential fiscal and monetary tools.
 4. The Central Bank of Myanmar has to be given more power in order to exercise effective monetary policy.
 5. Appropriate employment creation could do with creation of sound business environment for local and foreign investors.
 6. Export incentives such as tax exemption, loan providence, procedure facilitation, etc., are to be provided to drive exports.
 7. Both export and import diversification should be focused to improve trade structure.
 8. Total trade volume must be raised to get better ratio of trade to GDP labelled as degree of openness.
 9. Economic policies should be consistent and transparent in order to create sound business environment, and at the same time, should ensure to minimize the use of scarce natural resources as well as emission of the pollution load and volume in order to encourage green business.
 10. To mobilize savings and efficient allocation of investments, a sound financial system should be established.
 11. Sound and credible banking system should be established.
 12. It is necessary to let the market work.
- Green GDP in which environmental degradation is taken into account should be considered in the long run.

3.2.2 Sustainable Agricultural Development

Lead Institution

Ministry of Agriculture and Irrigation.

Collaborating Institution

Ministry of Commerce, Ministry of Industry (1), Ministry of Industry (2), and relevant departments and agencies.

Overview

There are three broad stages identified in the evolution of agricultural production. The first and most primitive one is low-productivity and subsistence-level farming. The second stage is diversified or mixed family agriculture where part of the produce is grown for consumption and part for sale to the commercial sector. The third stage represents the modern farm, exclusively engaged in high-productivity specialized agriculture geared to the commercial market. In the Myanmar agricultural sector, the mainstay of the economy, efforts have been made for development by setting three objectives such as surplus of paddy production, sufficiency of edible oil and expanding the production of beans and pulses for export and industrial raw

material (NCEA 1997). In 2004/2005 performance of the agricultural sector realized 100.5 percent of the plan target, and registered a growth rate of 10.3 per cent over 2003/2004 (MNPED 2006, September). The progress was due to the increased production of paddy, beans and pulses, wheat, maize, groundnut, sesame, sunflower, cotton, rubber, sugarcane, coffee, tea leaves, dried chillies, onion and potatoes. For all round sustainable development, it is important to be cautious in land use practice. In giving emphasis to development in this area, increased production of agricultural produce is to be resulted from vertical (yield) expansion rather than horizontal (acreage) one.

Sustained Increase of Overall Agricultural Production

Rationale: The overall development of Myanmar's national economy is highly reliant on agriculture. Agriculture plays a primary role in producing adequate raw materials for local agro-based industries and for export. Out of the total population, about 70 per cent are living in rural areas and dependent mainly in agriculture. More than 60 per cent of the total labour force actively engages in agriculture and related industries. The contribution to foreign export earnings was around 50 per cent before exploitation and export of natural gas. To sustain the agricultural sector, preservation and right land use practice must be given priority.

Objective: To put into action for sustainability and increase of the country's agricultural sector.

Activities

1. Practice rice-fish integrated cultivation in order to achieve double outputs as well as ecosystem maintenance.
2. Implement the greening of thirteen districts in the central dry zone of the country with the aims to combat soil losses, water losses, fertility losses, and desertification through protection of land against erosion, reducing run-off (water) and increasing infiltration and stopping nutrient losses due to erosion.
3. Introduce dry zone farming and soil conservation techniques in central Myanmar where wind and water erosion is common due to its prevailing characteristics and incorrect cultivation practices.

4. Educate and demonstrate contour ploughing, mixed cropping, suitable crop rotation, mulching, irrigation and hedge row and wind brake plantings.
5. Educate and demonstrate hillside farming techniques in hilly area, especially in border regions, where shifting cultivation is still practised.
6. Construct boulders to protect salt water intrusion into the field and wash out the salt from the affected soil with rain water.
7. Increase the cultivated area under irrigation by five different means: the construction of new reservoirs and dams, the renovation of existing reservoirs to increase storage capacity and ensure efficient delivery of irrigation water, the diversion of water from streams and rivulets during high water levels into adjacent ponds or depressions and for storage with sluice gates, and the lifting of water from rivers and streams through pump irrigation and the efficient utilization of ground water.
8. Encourage agricultural mechanization through local production and importation of machinery to meet demand, allowing the private sector to participate in both local production and importation, development of farm mechanization supervised by Myanmar Industrial Development Committee (MIDC).
9. Develop and transfer appropriate technologies to farmers for higher crop productivity, better cropping system and proper crop management.
10. Increase cropping intensity with suitable varieties and proper crop management.
11. Lower the level of chemical fertilizers and pesticides utilization, and give priority to the use of farmyard manure, green manure, compost and bio-fertilizers.
12. Educate farmers about using scouting techniques, setting economic threshold levels, and making decisions for appropriate spraying.
13. Gradually establish integrated pest management (IPM) system, and practice for important crops like rice, cotton, oilseed crops and pulses.
14. Encourage the production of organic pesticides for which the basic raw materials can be obtained from the Neem plants widely growing all over the country.

Performance Indicators

- Ratio of Use of High Yield Variety.
- Irrigated Area.
- Number of Farm Machineries in Action.
- Use of Chemical Fertilizer, Bio-fertilizer, Neem and Pesticide for Each Crop per Unit Area.
- Effective Area in Organic Farming.
- Seasonal Loan per Unit Area

Surplus in Paddy Production

Rationale: At one time, Myanmar was a leading rice exporting country in the world market. There is room to expand paddy production such as land resources, favourable soil and weather, the availability of increased water resource, the availability of farm labour, and relative wealth in professional and technical manpower.

Objective: To assure surplus of paddy production in order to export more rice and rice products.

Activities

1. Permit agricultural production freely.
2. Develop new agricultural land.
3. Safeguard the rights of farmers and give price incentives for paddy production through free trade of rice.
4. Permit participation of the private sector in the production of agricultural machinery and inputs.
5. Provide sufficient irrigation water.
6. Provide support for agricultural mechanization.
7. Encourage the application of modern agro-technologies.
8. Encourage Research and Development (R&D)
9. Encourage utilization of modern varieties.

10. Introduce summer rice programme.

Performance Indicators

- Yield per Acre in Paddy Production.
- Price Incentive to Produce Rice

Self-Sufficiency in Edible Oil Production

Rationale: Myanmar is a relatively high oil-consuming country with annual per capital edible oil consumption standing at 10 kilograms. About 5 per cent of total imports and 12 per cent of consumer goods imports are in the form of edible vegetable oils and other hydrogenated oils. The annual average production of vegetable oils, mainly groundnut and sesame oils, in Myanmar is estimated at about 500,000 tons. Myanmar also imports an average of 160,000 tons per year of palm oil.

Objective: To produce edible oil for self-sufficiency so that import might be reduced.

Activities

1. Promote the production of traditional oil crops such as groundnut, sesame, sunflower, etc.
2. Set the oil crops and oil seeds as the restricted export items.
3. Endow with land resources for oil palm cultivation in Tanintharyi Division, a prospective oil bowl in Myanmar.
4. Target to grow 202,500 hectares of oil palm in Tanintharyi Division to meet local edible oil demand and so far

60,750 hectares up to 2006 have been used for the purpose.

5. Support the financing to private companies engaged in large scale cultivation of oil palm.
6. Provide relative freedom to import tools and machineries for use in oil palm cultivation.
7. Boost oil crop production by expanding the availability of improved seeds and genetic material to oil crop farmers.
8. Initiate a 14-million-dollar three-year oil crop development project with a loan assistance provided by the Organization of Petroleum Exporting Countries (OPEC) and technical assistance provided by Food and Agriculture Organization (FAO) to boost oil crop production.
9. Educate awareness to reduce edible oil consumption.

Performance Indicators

- Edible Oil Import to Consumption Ratio.
- Edible Oil Import to Total Import Ratio.

Increased Production and Export of Pulses and Industrial Crops

Rationale: Although Myanmar had lost its favourable position in the rice sector in the international trade since post-independence, it gained a relatively important role in pulse and bean production and export in the current era. Regarding the cultivation of pulse and bean, sown acreage in 2004-2005 was 6,955,000 acres, and it has increased from 818,000 acres in 1987-88. The production also increased from 575,000 tons to 3,267,000 tons during this period. Thus, sown acreage went up 8.5 times while production rose 5.7 times within 17 years. Also in export volume, pulse and bean were sent abroad about 75,000 tons in 1987-88 and it increased to 14 times with 1,038,000 in 2004-05 (CSO 2005). After market liberalization, the role of pulse and bean sector has become important in Myanmar agricultural export. In the case of industrial crops, Myanmar produces

rubber, cotton, jute, sugarcane, kenaf, tobacco, etc. However, Myanmar could export raw rubber and raw jute in small amounts only.

Objective: To extend both production and export of pulses and industrial crops.

Activities

1. Relatively free from controls and restrictions the trade of pulses and beans compared to other crops such as rice.
2. Offer incentives to all exporters including that of pulses with import right by their export earnings.
3. Provide agricultural loans to farmers.
4. Provide advanced payment for such industrial crops as jute, Virginia tobacco, and sugarcane.

5. Disseminate market information about pulses and beans by Union of Myanmar Federation for Chamber of Commerce and Industry (UMFCCI).
6. Encourage natural rubber plantation.

Performance Indicators

- Production in Term of Volume.
- Export Share.
- Revealed Comparative Advantage (RCA) of Each Product.

Recommendations

1. Vertical expansion rather than horizontal expansion should be focused in agricultural production.
2. The use of organic fertilizers, bio-fertilizer and biological pest controls should be promoted rather than the use of chemicals.
3. Agricultural price liberalization should be applied along with greater market mechanism.
4. Irrigation system should complement agricultural community and must not have negative impacts.
5. Cost-Benefit analysis as well as environmental impact assessment (EIA) should be conducted in dam construction

and agricultural land expansion in environmentally sensitive areas such as wetlands.

6. It is important to establish collective farming and export zones to improve quality of agricultural produce.
7. Rules and regulations for organic farming should be imposed.
8. Land consolidation such as proper drainage, irrigation, and farm roads should be carried out.

Agro-based industries for value-added farm produce should be established

3.2.3 Sustainable Livestock and Fisheries Development

Lead Institution

Ministry of Livestock and Fisheries.

Collaborating Institution

Ministry of Commerce, Ministry of Energy, Ministry of Transport, Ministry of Electric Power

No. (1), Ministry of Electric Power No. (2), and relevant departments and agencies.

Overview

The fisheries sector is important in Myanmar’s economy as fish constitutes a major source of animal protein in the diet of the people and is the fifth largest source of foreign exchange earnings. There is much potential for the development and expansion of the country’s fisheries within Myanmar’s waters as well as in the exclusive economic zone. Myanmar has a long coastal line of 2,229 kilometres with a continental shelf area of 228,781 square kilometres. In Myanmar, inland water bodies such as natural lakes, reservoirs, river systems and ponds cover over a total area of about 8.2

million hectares. The Ayeyarwady, Chindwin, Sittaung and Thanlwin rivers constitute the main river systems, and these, together with the annual heavy rainfall, result in a fertile delta region and the formation of fresh water flood fisheries. Aquaculture development in Myanmar, however, is still in its infant stage except for pond culture. As well, livestock are an integral part of the agricultural economy and provide almost all the draft power and rural transport, and subsistence. Breeding of short cycle animals such as pigs and poultry will generate quick income for the farmers.

Increase of Livestock and Fisheries Production

Rationale: In Myanmar, ownership of livestock is characterized by small individual herds and flocks. There are vast potentials to raise livestock as areas of pasture land are available in various regions for the development of the cattle industry. Likewise, Myanmar's water and Exclusive Economic Zone (EEZ) possess varieties of and immense aquatic resources compared to neighbouring countries. Commercialization of aquaculture is also increasingly realized by the private sector.

Objective: Development of livestock, fish and prawn production to benefit the farming and fishing community and local consumers as well as to make more export earnings.

Activities

1. Grant virgin, fallow and vacant land to private entrepreneurs to undertake livestock breeding and fish culture on commercial scale.
2. Initiate special breeding zones to specialize in breeding specific draught animals.
3. Upgrade livestock breeding and disseminate modern curative methods in accordance with the Animal Health and Development Law of 1993.
4. Grant permission to private entrepreneurs to carry out the operation of some leasable fisheries on three-year settlement basis.
5. Give emphasis to the development of prawn culture as source of foreign exchange earnings.
6. Produce cultured pearls in collaboration with foreign as well as domestic companies on joint-venture basis.
7. Share the surplus marine resources with neighbouring countries by establishing joint ventures.
8. Promote the expansion of aquaculture both in marine and fresh-water environment.
9. Encourage livestock development by means of breeding programmes, disease and parasite control programme, and the provision of credit for livestock purchase and pasture development through the Myanmar Livestock and Fisheries Development Bank.
10. Support advanced technologies and disseminate scientific information through Myanmar Veterinary Council, Myanmar Livestock Federation and Myanmar Fisheries Federation.

Performance Indicators

- Total Production of Livestock.
- Total Production of Fish and Prawn.
- Per Capita Consumption of Eggs and Meat.
- Fishery Export.

Sustainable Fishery Production

Rationale: Because of excessive production of fresh water, in-shore and off-shore fishing, marine fishery reserves have become scarce over time. Fortunately, those in Myanmar's region are richer than those in neighbouring countries. For sustainable fishery production, conservation of marine resources is a must, and populations of marine species are to be maintained at such level that can produce the maximum sustainable yield determined by environmental and economic factors.

Objective: To maintain sustained production through systematic conservation of fishery resources.

Activities

1. Issue the Law Relating to the Fishing Rights of Foreign Fishing Vessels, Myanmar Aquaculture Law, Myanmar Marine Fisheries Law, and Myanmar Fresh Water Fisheries Law.
2. Disperse and release millions of fresh-water fingerlings into reservoirs, rivers, lakes, streams, etc., to increase fish population.
3. Undertake supervisory measures for enhancement of fish production and preventing depletion of fish stock by Myanmar Fisheries Law and related regulations.

4. Undertake Monitoring, Research and Surveillance (MRS) and prohibit fishing during closed-seasons and in closed-areas to control over-fishing, and penalize violators.

Performance Indicators

- Comparative Production of Fish between Nature and Cultivation
- Per Capita Production of Fish

Recommendations

1. Coastal zone development projects and programmes should pay great attention to managing coastal land, intertidal zones, freshwater supplies, natural hazards, and marine living resources.
 2. Effective protection measures should be taken in mangrove forests which are breeding grounds for fish and prawns.
 3. Fishery production from fish and prawn cultivation should be paid more attention than fishing from the natural sources.
- Establishment of commercial breeding zones should aim not only to fulfil domestic requirements but also to concentrate on exports.

3.2.4 Sustainable Forest Development

Lead Institution

Ministry of Forestry.

Collaborating Institution

Ministry of Agriculture and Irrigation, and relevant departments and agencies.

Overview

Myanmar stands in the world with pride for the richness of its forest resources and biodiversities. Up to the present, it is estimated that about 50 per cent of the total land area is covered by forests. These forests play an important role not only for the country’s economic and social development but also for environmental atmosphere improvement. Forests contribute basic needs of the people with multiple products, and are the domiciles for biodiversities. Moreover, they create benefit for other economic sectors such as agriculture, energy, livestock breeding, and

tourism. It is true that forests are to be sustained in favour of sustainable environment, ecosystem and socioeconomic development. Like other developing countries, Myanmar has to face the challenge of deforestation due to growing population, increasing socioeconomic needs and activities, for instance, urbanization and agricultural expansion. Thus, providing guidance and preservation the forests and sustainable production of forest resources by future generations are unavoidable responsibilities.

Develop the Forestry Sector to Meet Basic Needs and Targeted Income

Rationale: As Myanmar is a developing country, a large part of its population and economy has to rely on primary sectors including forestry. In Myanmar, the dependence of the rural area, where 70 per cent of the population resides, on forests is extremely high especially for food and

shelter. Harvesting and utilization of non-wood forest products are for sustenance as well as income. According to a survey on Myanmar forest dwellers practicing Taungya (shifting) cultivation have been provided knowledge of the forest conservation process. Bona-fide use

of non-wood forest products in the country has also been extended for commercial purposes. In short, the forestry sector is important for the national economy earning 10 per cent of total export earnings.

Objective: To enhance activities in forest sector to meet basic needs and national income.

Activities

1. Implement fuel-wood plantation projects at the village, village tract, and township levels.
2. Carry out extraction and marketing of forest products by Myanmar Timber Enterprise.
3. Further develop the Myanmar Forest Products Joint Venture Corporation Limited with Myanmar Timber Enterprise, Forest Department and the public formed in 1993.
4. Create awareness for alternate use of agriculture residues as fuel instead of firewood.
5. Substitute wood-based fuel with alternate energy such as briquettes and heat saving stove, renewable energy, etc.

6. Register non-wood forest products (NWFP) and promote its development to meet sustenance needs.
7. Provide research findings to determine methodology of harvesting and processing NWFP on a sustainable basis.
8. Increase forest areas by motivating and expanding community forestry and agroforestry on degraded lands, village tracts and farm lands.
9. Prevent illegal logging so that forest products can avoid underpricing.
10. Disseminate market information such as tender system to timber producers and exporters in order to find maximum price.
11. Support the development of wood-based industries so that forestry products will be high value-added goods, and maximum income will be generated with minimum raw materials of forest resources.
12. Develop forest based eco-tourism.

Performance Indicators

- Net Output from Forestry
- Export Earnings Received from Forestry

Accelerate Sustainable Development of Forest Resource

Rationale: Although forest resources are renewable, overexploitation of forest products tends to create severe deforestation. The need for long term maturity, reservation and preservation of forest resources should be included in the strategic plans of sustainable development. For Myanmar, the national forest inventory is conducted on a continuous basis of a ten-year cycle. Major sources of deforestation are over exploitation, illegal logging and forest fire.

Objective: To accelerate the programme of forest regeneration and planting to rehabilitate degraded forest areas.

Activities

1. Undertake supervisory measures for effective conservation and preservation of forest.
2. Carry out plantation and conservation under the supervision of Regional

Forest Conservation Committees formed since 1993 at various levels.

3. Focus on systematic extraction of teak, hard wood and other forest products based on Reduced Impact Logging (RIL).
4. Regenerate in shifting cultivated and encroached areas.
5. Develop an effective pest, disease and forest fire management and controlling system.
6. Classify unclassified forests as protected forests in order to reduce degradation and promote forest cover.
7. Stimulate people's participation in forestry development activities to ensure a sustainable relationship between people and forest resource base.

Performance Indicators

- Net Outturn from Forest Sector
- Annual Reforestation
- Percentage of Forest Covering Area

Promote Efficiency in Production of Goods and Services from the Forests

Rationale: Goods and services produced from the forest are indispensable supplies for basic needs and income generation in such developing countries as Myanmar. The point is not to prohibit production but to produce in a prudent manner. Lack of knowledge on sustainable forest management, inadequate infrastructure, inappropriate investments, outdated technologies, inefficient processing, shortage of skilled labour and high cost in transportation are constraints for efficient production of forest products.

Objective: To direct efficient production of goods and services in forestry sector.

Activities

1. Implement logging plans prior to harvesting to reduce impacts and to ensure scientific but cost effective harvesting.
2. Undertake a survey to determine the volume and types of residual stand including lesser-used species and small dimension materials to facilitate identification of their potential use in the domestic market.
3. Determine the Annual Allowable Cut (AAC) based on the needs of the changing environmental consideration.
4. Continuously study the possibilities and prospects of forest-based industrial development in Myanmar.
5. Monitor and evaluate the market competition of the value-added products from the Myanmar’s forest-based industries.
6. Undertake a periodic review of the present pricing of the forest products, subsidies, etc. and rationalize them.
7. Promote commercialization of all forest products in an appropriately phased manner.
8. Promote training courses for proficiency on forest-based industries and pricing policy, and harvesting technique for minimizing wasteful harvesting.

Performance Indicators

- Waste to Net Output Ratio.
- Value-added Forestry Product to Initial Raw Outturn Ratio.

Recommendations

1. Credible and continuous monitoring on real situation of reserved forests and protected forests must be carried out to examine deforestation status.
 2. A study on gap between production and consumption of forestry resources should be undertaken to meet basic needs of the population.
 3. Substitution of natural gas in the short run and electric power in the long run over fuel woods should be given priority.
 4. More value-added forestry products should be encouraged for export.
 5. Minimize export of timber in the form of logs.
 6. Maximization of forest income should focus on value-added products rather than quantity of forestry outputs.
- Reduced Impact Logging (RIL) should be promoted, and National Code of Forest Harvesting Practice should be implemented as soon as possible.

3.2.5 Sustainable Energy Development

Lead Institution

Ministry of Energy

Collaborating Institution

Ministry of Mines, Ministry of Cooperatives, Ministry of Electric Power No. (1), Ministry of Electric Power No. (2), Ministry of Science and

Technology, Myanmar Engineering Society (MES), and relevant departments and agencies.

Overview

Energy together with transportation and communication is the most fundamentally important infrastructure in sustainable growth as well as the quality of life of individuals. Energy is a crucial necessity engaged by a considerable range of society, from the poorest to the richest. It creates benefits with various types of contributions from fuels for cooking daily food to power for generation of modern high-tech electric and electronic goods. Myanmar is endowed with rich natural resources for production of commercial energy, and welcomes foreign companies to exploit oil and gas as well as to implement heavy electric power projects in the joint-venture basis. However, demand for energy is increasing all the time as a result of the growing population and active movements to industrial promotion. From the sustainable development aspects, convincing sources of energy should be focused on renewable resources such as hydro, wind, solar, tidal, geothermal and nuclear power.

Non-renewable resources including coal, oil and gas are unable to be replenished as they are fossil fuel energy sources and take too long to restore. Thus, non-renewable resources have become scarcer. Over reliance on them cannot be sustained. Even a likely renewable energy source like fuel wood, takes a relative long time more or less by the decades to be produced. At the same time, these kinds of energy products have negative externality, i.e. atmospheric emission, which tends to cause greenhouse effect. So, the increasing use of environmentally sound energy systems should be made, particularly new and renewable sources of energy. Myanmar energy policy also focuses on the maintenance of the status of energy independence, promotion of wider use of new and renewable sources of energy, to promote energy efficiency and conservation, and promotion of the use of alternative fuels in households.

Increase Energy Production and Consumption

Rationale: Energy facilities are crucial in developing countries such as Myanmar to transform an agricultural economy to an agro-based industrial one. In Myanmar, net domestic consumption per year was gradually increasing from 8714 KTOE in 1990/91 to 11979.5 KTOE in 2005/06.

Objective: To strengthen energy production by better integration of all forms of sources.

Activities

1. Develop all the available energy resources including hydro power,

geothermal energy, solar energy, wind energy, etc.

2. Increase the production level of existing energy resources.
3. Continuously update the unsuppressed energy demands.
4. Enhance the production of oil and gas implemented not only by the state sector but also by the private sector from domestic and abroad.
5. Replace and extend the existing electricity distribution network to meet the needs of the population and industrial development, and also the

- development of industrial establishment in rural and remote areas.
6. Reduce losses in distribution and enhance the efficiency of transmission and distribution by conducting systematic review at the national level to ensure the harmonization between national development plan and development in energy sector.
 7. Provide needed investment and advanced technologies for exploration of energy sources through invitation of foreign direct investment.
 8. Provide research and manpower developments through R&D work, professional training, and promoting of information technology.
 9. Educate the public on the efficient use of energy, energy conservation, environmental awareness, and global and regional issues of energy production and consumption.

Performance Indicators

- Total Supply of Primary Energy.
- Per Capita Energy Consumption.

Boost Electric Power Installation, Generation and Consumption

Rationale: In actual fact electric power is included in energy sector but its role is much higher than other energy sources. Moreover, power shortage is the most important obstacle in many developing countries for improving living standard, industrialization, growth, and sustainable development. Thus its importance cannot be overrated. Electricity production in Myanmar in 2006 was 137.8 kilowatt hour which was relatively low in the region. Without adequate electricity supply, all development activities will be hampered or stagnated and lives of ordinary people will be affected.

Objective: To guarantee fully generation of electric power, efficient transmission and distribution for satisfactory consumption.

Activities

1. Employ gas turbine power generation only for short term and to rely on hydroelectric power as one vital source of energy efficiency.

2. Promote electricity production from new and renewable source of power.
3. Reduce losses and conserve electric power for future sufficiency of the country.
4. Maintain the production level of existing power generating resources.
5. Continuously update the unsuppressed electricity demand.
6. Reduce use of natural gas by partially substituting combined cycle power generation.
7. Provide diesel generator for electricity production in remote regions where hydropower cannot be operated and national grid is inaccessible.
8. Construct efficient transmission and distribution lines.

Performance Indicators

- Total Power Generation.
- Per Capita Power Consumption.

Maintain Resources of Energy for Future Generation

Rationale: Rich energy sources in Myanmar include both non-renewable energy such as crude oil, natural gas and coal, and renewable energy such as hydro energy, geothermal energy, solar energy, wind energy and biomass energy. Although Myanmar has still mass of untapped non-renewable energy sources, rising demand for energy requires increased exploitation and production of non-renewable sources and at the same time to encourage on

the development of new and renewable energy sources to meet sustainable development.

Objective: To undertake gradual shifting from the use of non-renewable to renewable resources for energy production.

Activities

1. Effort to produce more proportion of electricity from hydro power as Myanmar has much potential with the estimated capacity of 38,000 megawatt

from which only 340 megawatt equivalent to less than 1 per cent was generated.

2. Introduction of project to produce geothermal energy as 93 hot streams already surveyed were appropriate for use of geothermal energy with the highest underground temperature of 200 degree centigrade.
3. Aim for widespread use of solar energy pilot projects in producing salt, charging batteries, and in-house lighting.
4. Encourage private entrepreneurs for electricity generation through wind energy as Myanmar has long coastal line supporting the wind flow into

inland region as well as during hot weather in dry region which supports the speed of wind.

5. Cultivate physic nut on a large scale to use its oil in driving farm machineries, water pumps, generators, etc., as substitutable fuel for diesel.
6. Encourage the use of wastes from saw-mills and rice-mills as the main fuel for their boilers.

Performance Indicators

- Annual Energy Production by Various Types of Resources.
- Renewable Energy Production to Total Energy Production Ratio.

Recommendations

1. State monopoly in the energy sector should be reduced and private participation should be promoted.
2. Technologies as well as research and development (R&D) should be encouraged to replace non-renewable energy with renewable ones.
3. Government subsidies are needed to persuade the use of renewable energy sources at affordable price.
4. Vigorous efforts should be made to reduce losses of power in transmission and distribution.
5. EIA methodology should be applied in electric power generation, transmission and distribution.
6. Myanmar should recognize the need for care to avoid the natural resource curse which has already affected many countries

that are rich in natural resources that hindered their sustainable development.

7. Myanmar should consider sustainable energy production and consumption policies such as international cooperation for sustainable consumption and production campaigns, technologies increasing national industrial competitiveness by promoting sustainable management, promotion of environmentally friendly farming and resource circulating waste management.

Myanmar should consider mechanisms and explore implementation used in other countries for avoiding natural resource curse issues through transparency mechanisms and examine the extractive industry transparency initiatives.

3.2.6 Sustainable Mining Sector Development

Lead Institution

Ministry of Mines

Collaborating Institution

Ministry of Forestry, Ministry of Transport, and Relevant Departments and Agencies.

Overview

Many developing countries strive for mineral investment, which they hope will catalyze broad processes of economic development. The governments of developing countries have argued that mineral wealth is a national patrimony and that rents from its extraction should be used to promote economic development. Myanmar is well known for its rich endowment of a wide variety of mineral resources. Besides energy resources of oil, gas and coal, other mineral products including tin, lead, zinc, tungsten, silver, gold, iron, copper and antimony are found in Myanmar soil. The country also produces high-quality gems and precious stones like jade, ruby, and emerald. Apart from them, industrial minerals such as barite, gypsum, limestone, dolomite, bentonite,

and fireclay can also be found. In order to fulfil the growing domestic needs of mineral and metal products as well as to promote export, the Ministry of Mines administering all mining activities has stepped up the production level of mineral products. Local private enterprises for gem stones and foreign participation for copper, gold, lead, zinc, iron and steel were invited to invest in production. Thus almost all mineral products are increasingly being exploited. For example, production of jade increased from 43,000 kilogram in 1985/86 to 15,230,000 kilograms in 2004/05. Since these mineral resources are non-renewable and at the same time are a source of pride to the nation it is necessary to carry out systematic exploitation.

Fulfil Mineral Resource Requirements of Local Industries and Promote Export

Rationale: At the initial stage of economic development, every economy has to rely on extraction of their own-rich natural resources including minerals for domestic use and export. The role of natural mineral resources in Myanmar economy is quite significant. With a view to fulfilling the domestic requirements and promoting export of minerals, mineral exploration and extraction of various minerals are extended for the development of heavy industries in the long run. Thus, active participation of the private sector from within the country and abroad is encouraged to promote production in the mining sector.

Objective: To increase efficiency-oriented production in mineral sector to complete domestic requirement and promote export.

Activities

1. Promulgate the new Myanmar Mines Law in 1994.
2. Notify The Myanmar Mines Rules in 1996 in exercise of the powers conferred under Myanmar Mines Law.

3. Carry out extensive mineral exploration through State owned mining enterprises and in collaborations with the local and foreign entrepreneurs.
4. Conduct survey works and feasibility studies on development of mines, milling smelting and refining works.
5. Grant blocks to private individuals with a view to promote production of minerals which has market potentials.
6. Permit and grant blocks to private individuals for production of gems and jade.
7. Promote mutual cooperation in restoration and renovation of mines, and in mineral production.
8. Encourage wide production of high value-added finished products.
9. Search and develop the mineral products which have the potential to penetrate world mineral market in order to increase exports.

Performance Indicators

- Net Production in Mining Sector.
- Export of Mineral Products.

Prolong Sufficient Reserve of Mineral Resources

Rationale: For a developing country such as Myanmar, it is understandable that the primary sector, most of which are natural resources, is dominant in the economy. Natural resources provide the country with goods that can be traded, and hence guarantee a certain revenue stream from exports for import of a certain volume of crucial goods. On the other hand, yield maximization with resource-use minimization in mining and mineral processing operations should be emphasized to sustain mineral resources. With this in view, the Ministry of Mines was assigned as the responsible organization to carry out survey about general mineral resources.

Objective: To utilize mineral resources in the sustainable basis in order to keep sufficient reserve.

Activities

1. Map out to assist countrywide mineral prospecting and exploration.
2. Carry out prospecting, exploration, and feasibility study to identify geologically and commercially potential reserves of mineral resources.
3. Prohibit the practice of diving and quarrying jade and gem stones in the rivers.

Recommendations

1. Modern technology including satellite images and airborne geophysics are needed to explore potential mineral areas.
2. Effective monitoring system should be developed to ensure that mining operations are conducted in accordance with regulations.
3. Tax incentives such as high rate on raw exports and low rate on finished products should be applied to promote value-added manufacturing process.
4. Economic incentives and instruments are needed to introduce to encourage companies to promote integrated utilization of mineral resources, treatment of mining wastes, recovery of useful minerals in a cost effective manner, introduction of techniques of waste minimization and cleaner production for exploitation of mineral resources.
5. Alternative mechanisms to the harmful use of mercury in the gold production should be promoted.

Performance Indicators

- Annual Production in Mining Sector.
- Potential Reserve of Mineral Resources.
- Value Added to Raw Minerals Ratio.

3.2.7 Sustainable Industrial Development

Lead Institution

Myanmar Industrial Development Committee (MIDC).

Collaborating Institution

Ministry of Industry (1), Ministry of Industry (2), Ministry of Energy, Ministry of Electric Power No. (2), Ministry of Commerce, Ministry of Cooperatives, Ministry of Labor, Union of Myanmar Federation for Chamber of

Commerce and Industry (UMFCCI), Myanmar Industrial Association (MIA), Myanmar Engineering Society (MES), and relevant departments and agencies.

Overview

The ultimate ambition of all developing countries is to set up industrialized developed economies. Resource-extracted economies may enrich countries but it cannot be sustainable. So the attempts have to emphasize on structural change from agricultural dependent economy to industrial based one. The development of the industrial sector plays a very important role in transforming Myanmar into a new modern developed country. The industrial sector will not only fulfil the basic needs of the people, but also earn foreign exchange through export expansion, and save foreign exchange through creation of import substitution, create domestic employment, and regional development. Myanmar has room for industrial development because of its rich natural resources, qualified

human resources, fine climate, and favourable geographical location. However, the industrial sector's contribution to the total GDP in Myanmar has been merely 10 to 15 per cent for many decades, and the lowest one in the region. The vision of Myanmar regarding industrial development is to increase the contribution of industrial sector to 25 percent of the national GDP. For further development of the industrial sector efforts have to be broadened together with the use of environment friendly practices as environmental degradation such as emissions and pollution is usually caused by industrialization.

Enhance Industrial Sector Development

Rationale: Since initiation of the market-oriented economic system in 1988, new regulations such as the Foreign Investment Law, the State-Owned Enterprises Law, and the Private Industrial Enterprises Law have allowed the rebirth of private sector and the entry of foreign capital. This has created a significant increase in industrial investment and production. Although the government reduced its direct involvement in economic activities by privatizing selected industries, the position of state-owned enterprises is still large. It is a cause of the unchanged industrial structure. Nevertheless, industrial products including farming equipment such as tractors and irrigation pumps, motorized vehicles such as

truck, light/mini truck and passenger cars, and power equipment such as transformers, motors, small generators, and electric household appliances are being produced locally.

Objective: To improve the industrial sector for import substitution as well as export promotion.

Activities

1. Create Myanmar Industrial Development Committee (MIDC) to monitor respective zones.
2. Establish eighteen industrial zones across the country.

3. Form eleven sub-committees to assist industrial development.
4. Introduce new notifications and laws to enhance industrial development.
5. Encourage the operation of enterprises at full capacity and reduce waste.
6. Plan and implement the establishment of new industries based on regionally available resources to develop that region.
7. Give priority to production of new commodity items based on the utilization of local resources.
8. Invite more inflow of foreign investments, industrial technologies, and managerial skills.
9. Promote quality control of industrial products to meet international standard.
10. Form cooperation and coordination between the State and private entrepreneurs for development of the industrial sector.
11. Expand export promoting and import substituting industries as well as agriculture support industries.
12. Provide capital and technology besides basic infrastructure so that already established industrial zone flourish on their own strength.

Performance Indicators

- Structure of the Economy
- Production from Manufacturing Sector
- Export of Manufacturing Products

Introduce Cleaner Production and Promote Greener Products

Rationale: There is adverse effect of industrial development including air and water pollution. In Myanmar, pollution level due to industrialization is relatively small as it has been stepped up only in recent year. As the saying goes prevention is better than cure, taking measures for minimization of undesirable development effects on the environment is an obligatory action every community living on the earth should undertake. However such preventive measures are rather weak in almost all developing countries. Environmental Kuznet Curve also pointed out that environmental degradation is worsened at the early stage of industrialization. Nevertheless, Myanmar pays attention for the development of environmental friendly manufacturing practice.

Objective: To promote cleaner production and greener products for reduction of environmental pollution from the manufacturing sector.

Activities

1. Include environmental considerations as investment criteria in the regulation issued by Myanmar Investment Commission (MIC).

2. Instruct systematic disposals in each industrial zone and inspect occasionally.
3. Educate and share knowledge with employers and employees about the negative externality of pollution and means to control.
4. Encourage large industries to obtain ISO (14000 series) certificate with reference to environmental management standards.
5. Practice community-based business establishment approach in which neighbouring households' conformity is necessary to set up a manufacturing industry.
6. Allow open voice of the public through state-run newspapers and other media about harm caused to them, for example harmful smell, noise, or other damaging stresses due to certain business.

Performance Indicators

- Number of firms awarded the environment related ISO Certificate.
- Number of Firms with Air and Waste Water Treatment Facility.

Recommendation

1. Establish clear industrial policy, for instance, export promoting industrialization or import substituting one as well as heavy industries or small and medium industries (SMIs) basis should be approved to be in consistent with trade policies.
2. More provision for clustering, market and credit accessibility, related information, etc. should be made and SMEs Law instituted as the SME sector involves more than 90 percent of the whole economy.
3. Adequate infrastructure including electric power should be provided.
4. Not only pragmatic plans and targets but also strategy and actions should be prepared to meet possible growth of industrialization.
5. Dual technology comprising low-tech and hi-tech is appropriate to establish self-reliance industries for domestic market on one hand and to establish competitive industries for penetrating world market and controlling pollution.
6. Short term and long term plans should focus on the use of economic instruments such as taxation and subsidies for production of greener products.
7. Team for cleaner production should be established to carry out such activities as environmental and economic auditing.
8. Waste treatment and drainage system should be considered in designing industrial zones and parks.
9. The concept and fundamentals of cleaner production methodology should be disseminated to the public and private industries.
10. Fire protection plan should be incorporated into every industrial zone planning.

3.2.8 Sustainable Transportation and Communication Development

Lead Institution

Ministry of Construction, Ministry of Transport, Ministry of Rail Transportation, Ministry for Progress of Border Areas and National Races

and Development Affairs, Ministry of Communications, Posts and Telegraphs.

Collaborating Institution

Ministry for Progress of Border Areas and National Races and Development Affairs, Ministry of Commerce, Ministry of Science and

Technology, and Relevant Departments and Agencies.

Overview

Ample transportation facilities are critical to economic development, because they enable access to resources, goods, and markets. When the transportation infrastructure lags behind an expanding population and economy, the country will begin to fall behind in economic development. Likewise, communication infrastructure is required not only to build electronic highways that are critical for a healthy information-driven economy but also to provide information for early warning against disasters. During transitional period of Myanmar, rapid increase of union highways, long bridges, and road networks within and

among urban and rural were realized with annual growth rate of about 2.0 per cent over the last two decades. Route and track mileage in railway also increased at about an average of 3.5 per cent per year during the same period. Sea and air ports were besides expanded and upgraded for transport sector facilitation. Communication especially telecommunication was increased much speedily compared to previous administration. Significant extension of fixed phones to village-level, creation of public access to communication, introduction of CDMA radio-telephone system in Yangon, and broadening GSM system to major cities were

evidence of communication sector development. Amongst them, attention should place for sustainable development by means of larger participation of public sector, removal of special group practice in accessing transport

and communication facilities, and adequate provision of these facilities as the public goods. Moreover, their negative externalities such as noise pollution and emission generated by airplanes are to be considered.

Develop Transport and Communication Infrastructure in a Sustained Basis

Rationale: Since last two decades, infrastructure development in Myanmar has been emphasized, and one of the national tasks already declared was “to develop secure and smooth infrastructure network throughout the Union” with a special objective of reducing or eliminating the development gap between different region. Major infrastructure projects were designated as special projects and given priority in budget allocation, and coordinated by the highest authority. However, there is a shortfall in the provision of both transportation and communication infrastructure compared to other countries in the region. In the case for reduction of environmental pollution arising from development in the transport sector, Myanmar has become a signatory to various international conventions but realization is rather weak.

Objective: To develop transportation and telecommunication infrastructure incorporating environmental protection measures.

Activities

1. Form the Central Committee, Work Committee, Work Subcommittee, and Regional Work Committee for the development works including transportation.
2. Expand economic infrastructure such as roads and bridges, and communication services under the projects of development for border areas and national races.
3. Enable private entrepreneurs to lease public assets on a contractual basis, and invite private companies to bid for toll road construction on union highways.
4. Implement the special project for extending of rail roads and rail routes.
5. Operate rail buses and purchase coaches from abroad by Myanmar Railways.

6. Encourage to harmonize between fleet optimization and inland water transport infrastructure improvement.
7. Engage the state-own shipping line in joint ventures with foreign partners.
8. Construct international class jetties and container-terminals by the Myanmar Port Authority for extending of services.
9. Extend domestic and international flights in collaboration with private entrepreneurs by the Myanmar Airways.
10. Extend construction of international airports and upgrade existing airports by the Department of Civil Aviation.
11. Control emission of automobiles through license renewal by Road Transport Administration Department.
12. Lay down horn free zones in Yangon to reduce noise pollution.
13. Extend and upgrade communication stations (post office) and major tasks such as mail services and money order.
14. Extend and upgrade telegraph offices, computerize in sending and receiving telegraph.
15. Extend installation of domestic facsimiles and public e-mail service.
16. Extend telephone long distance lines, installation of microwave routes, auto exchange lines, and auto radio telephone system.
17. Install region wise direct exchange lines (DEL), and extend overseas telecommunication channels.
18. Undertake a cordless phone system per village under the Rural Communication Development Programme for smooth and easy communication among remote communities.

Performance Indicators

- Paved Road Length Per 1,000 Square Kilometres.
- Rail Road Track Length per 1,000 Square Kilometres.

- Post Office per 100,000 people.
- Telephone Lines per 1,000 People.

Recommendations

1. Supply of rolling stocks should be raised to meet demand in rail transportation.
2. Economic analysis should be conducted in construction and expansion of transportation infrastructures.
3. Rent creation practice should be reduced to be able to access transportation and communication facilities by the general public.
4. The role of private participation in communication sector should be expanded to lower cost with higher quality.

3.2.9 Sustainable Tourism Development

Lead Institution

Ministry of Hotels and Tourism.

Collaborating Institution

Ministry of Foreign Affairs, Ministry of Transport, Ministry of Immigration and

Manpower, and relevant departments and agencies.

Overview

Tourism which is said to be a smokeless industry plays an important part not only in the growth of the service sector but also as a major supporter for sustainable development in a country. The larger proportion of service sector in an economy is a sign of structural change or economic improvement. In a similar way, integrated tourism with environment so-called ecotourism generates substantial monetary returns and specific employment opportunities

while preserving natural environment so that leads to sustainable development. In Myanmar, there are vast prospects for tourism development because of the natural attractions and rich historical and cultural heritage. However, without a proper infrastructure, tourism cannot be developed so adequate infrastructural facilities need to be provided.

Enhance Service Sector through Tourism Development

Rationale: Tourism promotion in Myanmar has been highlighted since the end of stabilization period. The Myanmar Hotels and Tourism Law was promulgated on 23 October 1993 with the objectives to promote hotels and tourism systematically, to enable the tourist to study the cultural heritage and natural beauty, to safeguard the natural environment, to contribute to international friendship, and to increase job opportunities. The number of

tourists entering Myanmar increased gradually but was still low compared to other countries in the region, for example, tourist arrivals in Myanmar reached more than 0.6 million in 2006 compared with 1.7 million in Cambodia.

Objective: To strengthen tourism development for contribution of larger earnings to the service sector.

Activities

1. Formed Ministry of Hotels and Tourism in 1992.
2. Promulgated The Myanmar Hotels and Tourism Law in 1993.
3. Open the entry points to Myanmar for tourists not only through airports but also through cross border check points.
4. Permit border pass as well as arrival visa to induce foreigners.
5. Invite participation in terms of capital investment and transfer of technology from sources inside the country and abroad to develop the tourism infrastructure.
6. Prescribe fifteen designated ecotourism sites by Ministry of Forestry.
7. Provide information through the Internet about hotels and other facilities.
8. Provide infrastructures especially transportation facilities to develop tourism sector.
9. Start several new international flights including regular ones by a low-cost airline, Thai Air Asia.
10. Develop agreement between Myanmar and Cambodia to create direct air links between Cambodia's Angkor Wat temple complex and two of Myanmar's tourist destinations - Bagan and Mandalay.
11. Arrange a variety of tours such as bike-tour, hiking-tour, eco-tour, golf-tour, meditation-tour, etc., by private tour agencies.

Performance Indicators

- Number of Tourists who visited Myanmar.
- Total Income from Tourism Sector.

Recommendations

1. External networks for tourism promotion are to be extended by private sector as well as State support.
2. More infrastructure support services must be provided for tourism development.
3. Natural, cultural and national heritages should continue to be systematically conserved and maintained to attract foreign visitors in the long run.
4. Potential eco-tourism sites are to be followed in line with exploration and to be further extension.
5. Ensuring the safety and satisfaction of tourists should be emphasized.



3.3 GOAL 3: SUSTAINABLE SOCIAL DEVELOPMENT

3.3.1 Create a Knowledge Based Society

Lead Institution

Ministry of Education

Collaborating Institution

National Commission for Environmental Affairs.

Overview

The Government of Myanmar has drafted the long-term plan for basic education development (2001 - 2031). The vision of education, as stated in the 30-Year Long-Term Education Development Plan, is "To create an education system that can generate a learning society capable of facing the challenges of the

Knowledge Age". The goal of the 30-year Long-Term Plan of the Basic Education Sub-Sector is to transform the whole Myanmar society into a lifelong learning society. The first four-year plan has been implemented and most of the goals have been achieved.

Completion of Basic Education by all Citizens

Rationale: Completion of Basic Education by all Citizens is one of the programmes included in the ten broad programmes of the 30-Year Long-Term Education Plan and is also one of the programmes of Education for All (EFA). According to the Union of Myanmar Basic Education Law (1974), basic education is education from 3 Rs upward prescribed as basic

education by the Government. Universalization of Basic Education will provide access to basic education for all those belonging to 5-15 age groups (lower secondary level). The assessment of the first four-year plan completed in 2005 revealed a gap between the target and attained level of performance which is as follows:

Table 2: Completion of Basic Education by all Citizens

	Target (%)	Actual (%)
Gross intake rate by 2005	108	105.6
Net intake rate by 2005	96	97.8
Gross enrolment ration by 2005	94	89.6
Net enrolment rate by 2005	85	82.2

The above performance indicators revealed the necessity of increasing the momentum for sustainable development.

Objective: To provide opportunities for all citizens to have access to Basic education

Activities

1. Conduct case studies and formulate a policy framework and expand plans to develop Inclusive Education.
2. Develop outreach programmes for children in remote, border and mountainous areas.

3. Ensure increased enrolment through enrolment week.
4. Expand Non-Formal Primary Education (NFPE) Programme.
5. Undertake a pilot programme on a Non-Formal Middle School Education (NFMSE).
6. Increase co-ordination with Monastic Schools.

Performance Indicator

- Measure the gap between the target and attained level of performance.

Enhancement of Awareness of Environment Education at all Levels

Rationale: Environmental education has been defined as the process of helping people, through formal, non-formal, and informal education to acquire understanding, skills and values that will enable them to participate as active and informed citizens in the development of ecologically sustainable and socially just society. The aim of environmental education is to make use of the knowledge obtained in preserving, conserving and utilizing the environment in a sustainable manner for the benefit of present and future generations. In Myanmar, at present, primary and secondary students are learning about the environment through their science textbooks which include chapters relating to topics, such as, deforestation, land degradation, biodiversity

conservation, etc. At the tertiary level, topics relating to the environment are included in the curricula of a number of arts and science degree courses such as Law, International Relations, Geography, etc. The Environmental studies degree course has been introduced at the tertiary level since October 2001. Thus there is a steadily growing awareness of the environment but the progress is not as fast as in the more advanced countries in the region.

Objective: To promote and enhance environmental awareness through the promotion of environmental education in both formal and non-formal education programmes.

Activities

1. Strengthen collaboration between the National Commission for Environmental Affairs and the Ministry of Education and provide more Environmental Education in the curricula.
2. Develop Environmental Education Materials.
3. Establish programmes to build the capacity of teachers.

4. Strengthen collaboration between NGOs concerned with the environment and their participation in environmental education activities.
5. Strengthen cooperation between formal and non-formal education.

Performance Indicators

- Review the curricula of Basic Education
- Measure environmental education through surveys

Achieving Gender Equality and Parity

Rationale: Gender refers to the roles and responsibilities of men and women that are created in our families, our societies and our cultures. The concept of gender also includes the expectations held about the characteristics, aptitudes and likely behaviours of both women and men (UNESCO Gender Toolkit). It is clearly distinguished from sex, which describes the biological differences between men and women. "Gender equality" means that "women and men have equal conditions for realizing their full human rights and for contributing to, and benefiting from, economic, social, cultural and political development". It is therefore the equal valuing by society of the similarities and the differences and their roles they play (UNESCO Gender Toolkit).

In terms of access, gender equality means equal opportunities to attend school; in terms of quality, it encompasses equality in the learning process, equality of learning outcomes, and equality of job opportunities and earnings. To look beyond parity, one must carefully examine textbooks and learning materials for stereotyping images, unequal education opportunities and the burden of household chores.

The general trend in primary, secondary and tertiary education, related to ratio of girls to boys is shown in the following table. The ratio of girls to boys is relatively high. Also, the higher achievement of girls in education may perhaps be attributable to their ability to focus more on learning the lessons.

Table 3: Ratio of girls to boys in level of education

Indicators	1990	1995	2000	2005
Ratio of girls to boys in - primary education	92.82	93.86	98.40	98.88
- secondary education	93.64	100.46	99.20	101.11
- tertiary education	150.64	152.66	167.58	154.62

Source: DEPT & DHE

If one looks at the table above it can be stated that there is no gender issues in Myanmar. However, gender equality in terms of quality is lacking with regard to curricula, textbooks and teachers. Regarding textbooks and materials, they often contain stereo type images of boys

and girls, i.e., use of stereotypic language and illustrations, lack of female role models, etc.

In Myanmar, the majority of teachers are women as can be seen in the following data.

Table 4: Percentage of Female Teachers in Basic Education Schools

Sr. No	Sex	2003 / 2004		2004 / 2005		2005 / 2006	
		No	%	No	%	No	%
1	Male	30654	15.83	29252	14.39	29356	13.93
2	Female	162938	84.17	174059	85.61	181349	86.07
Total		193592	100	203311	100	210705	100

Source: DEPT

The data reveal that there are fewer male teachers than female teachers in Myanmar. The data indicate that Myanmar has achieved gender equality in girls' and boys' enrolment but is lacking in male teachers and there is a need to examine carefully textbooks, and learning materials for stereotyping images. Thus, it is necessary to a certain extent to improve gender equality.

Objective: To eliminate gender gaps and gender inequality in education.

Activities

1. Conduct gender awareness and training for staff at all levels (from senior management to the school level)
2. Review and assess gender equity in textbooks, curricula and learning materials.

3. Conduct gender training in regular teacher training.
4. Conduct a research on training beliefs and cultural practices that have effects on girls' education.
5. Offer incentives for more male participation as teaching staff.
6. Collect disaggregated statistics in all areas such as net enrolment, retention, and drop-outs.
7. Raise awareness of gender issues through media.

Performance Indicators

- Number of gender awareness training
- More gender equity in textbooks

Life Skills and Lifelong Learning through Non-Formal Education

Rationale: Life skills-based education is a right for all young people and is an important element of quality. It is defined as "The acquisition of knowledge, values, attitudes and skills through the four pillars of learning: learning to know, learning to do, learning to live together and with others, and learning to be." (Report to UNESCO of the International Commission on Education for the Twenty-first Century) Learning needs in Myanmar include acquiring decision making skills, development of communication skills, income generation abilities, technical and vocational education, health knowledge, literacy and numeracy. Life Skills and Lifelong education will equip young people (aged 10-24) and adults (aged 25 +) with psychosocial competencies that will allow them to cope with their health and well being.

Non-Formal Education (NFE) can lead to greater flexibility in organization and management of education programmes with a decentralized structure and less authoritarian management

styles. It also promotes adaptation of programmes to the needs and wants of learners and is mainly provided for the out-of-school population.

Linking education to life after school is an important strategy in modernizing an economy. With the growth in population and in the labour force, Myanmar needs to create more jobs that will eventually generate demand for a wide range of new skills. An efficient education system must develop capacity and flexibility to respond effectively to the needs of an emerging economy with a labour force possessing the skills and entrepreneurial attitudes needed for such an economy. Moreover, NFE programmes need to be structured to meet the immediate needs of the out-of-school population so that they can pursue a variety of Life Skills development programmes at their own pace. NFE programmes should be structured flexibly and be of a quality equivalent with the formal system, so that learners can independently self-

develop through Continuing Education or Lifelong Education.

Objective: To disseminate knowledge of life skills to out-of-school population through NFE.

Activities

1. Implement community based Extended and Continuous Education and Learning (EXCEL) for up to the target of 50,000 out-of-school young people in 46 townships by 2015.
2. Expand the pre-service Education College Peer Education programme.
3. Motivate and organize parent and community participation for both in- and out-of-school children to create an enabling environment for the

development of safe behaviours and healthy practices.

4. Increase NGO partnerships in non-formal approach to Life Skills to reach out of school children through EXCEL project.
5. Update and revise primary school Life Skills core curriculum.
6. Expand Technical and Vocational Education and Training to meet national manpower needs.
7. Expand out-of-school programmes in income generation and skills-based learning.

Performance Indicator

- Measure the gap between the target and attained level of performance.

Disseminate Advanced ICT in Tertiary Education

Rationale: The importance of ICT as a tool to promote people’s empowerment, rights and dignity and full participation in the information society has been accepted by the government. Thus, activities have been implemented in both basic and tertiary education to enhance the knowledge of ICT. Six programmes have been identified in the 30-year long-term education plan. Curriculum has been introduced to include ICT in the undergraduate programmes. Out of the six programmes, one programme focuses on dissemination advanced ICT not only solely as technology but to be used as a learning technology.

Objective: To disseminate advanced ICT in tertiary education not only as a teaching technology but also as a learning technology.

Activities

1. Expand ICT knowledge in all teaching departments at universities and colleges.
2. Establish an ICT park.
3. Create a hardware and software research centre in ICT Park.
4. Expand resource centres, learning centres, training centres in all teaching departments.
5. Promote the centres with modern updated equipments.
6. Train technicians to maintain the equipment.

Performance Indicator

- Review the activities.

Recommendations

1. Strengthen collaboration of local communities and organizations.
2. Increase social mobilization.
3. Monitoring of teachers disseminating environmental education should be conducted regularly.
4. Conduct an assessment of how much gender mainstreaming has gone so far and what the gaps are and carry out comparative studies to assess gender issues.
5. Use gender-lens and gender analysis to assess existing programmes both in formal and alternative systems.
6. Incorporate assessment with the MDG assessment process, using indicators that have been developed and adding qualitative aspects.
7. Conduct more researches and studies on gender indicators and advocate for the wider use of gender sensitive indicators.

8. Formulate an assessment framework on gender disparity and quality to cover the following:
 - Retention
 - Teacher recruitment
 - Curriculum / text-books
 - Physical facilities /safety / security (school location, safe transportation)
 - Teaching / learning practices in the classroom
 - Incentives
 - Language issues
 - School management
 - Monitoring and evaluation
9. Gender indicators should also be improved and expanded with clear definitions.
10. Expand advocacy and research on the importance of life skills at all levels.
11. Improve co-ordination among all ministries and agencies, religions institutions, media and other sectors in promoting Life Skills, using a holistic approach.
12. Strengthen capacity building through expanded trainings, workshops and meetings on the monitoring, implementation and assessment of Life Skills at both national and sub-national levels.
13. Raise awareness of the benefits of ICT among students.
14. Carry out monitoring annually at universities and colleges regarding students' use of these centres.

3.3.2 Vulnerable Group: Women

Lead Institution

Ministry of Social Welfare, Relief and Resettlement.

Collaborating Institution

Ministry of Education, Ministry of Health, Ministry of Home Affairs, Ministry of Culture, Ministry of Hotels and Tourism, Ministry for

Progress of Border Areas and National Races and Development Affairs, YCDC, MNCWA, MWAF, and other INGOs and NGOs.

Overview

Women all over the world play an important role in accelerating the progress of the society towards the desired population, environment and development goals. In Myanmar, the female population (50.3%) exceeds the male population (49.7%) (Department of Population). Myanmar women are enjoying equal rights with men as there is no discrimination based on race, religion, status and sex in Myanmar. The Government of Myanmar recognizes the important role women play in society and it intends to make use of their full participation in national development activities. Thus a National Committee called the Myanmar National Committee for Women's Affairs (MNCWA) was formed on 3 July 1996 to systematically implement activities for the advancement of women. This is an outcome of

the Fourth World Women's Conference which adopted the Beijing Platform for Action that identified twelve critical areas of concern for women. The twelve areas included are Education, Health, Violence Against Women, Economy, Girl-Child, Environment, Media and a National Machinery for Women, Women in Decision Making Level, Women in Armed Conflict, Women's Rights, Women and Poverty. From these areas, those relevant for Myanmar women are given emphasis and measures have been taken to draw strategies and implement activities in order to empower women. As MNCWA is a committee, it comprises only members who are designated by the government and thus there was a limitation in implementation activities. To carry out these activities more affectively and systematically a

local NGO namely Myanmar Women's Affairs Federation (MWAFF) was formed in November 2003.

The concept of women empowerment is stated thus "women must be able to participate in the

development process based on the belief, supported by growing evidence, that development cannot be achieved nor sustained without the participation of the people themselves in the development process".

Reducing Violence against Women

Rationale: Although violence against women is not a major issue in Myanmar as in some other countries, no one can deny that it does not exist in the country. It is accepted that it hinders development and advancement of women. The two major types of violence are Physical Violence (includes sexual violence) and Mental Violence. These two types of violence occur in the home and in society. Thus integrated measures to prevent and reduce violence against women should be taken.

Objective: To prevent and reduce incidence of violence against women.

Activities

1. Conduct a research on the causes and consequences of violence against women.
2. Hold small group discussions in the community to enhance awareness of the negative effects of violence against women.
3. Involve the men in discussion of the negative effects of violence against women.
4. Raise awareness of women of their rights through media.

Performance Indicator

- Measure the incidence of violence against women.

Women and the Economy

Rationale: According to the Myanmar labour force survey in the 2002-2003 data, 9.79 million females are in the labour force. As in many countries a very high proportion of all female employment is absorbed by the informal sector. The activities for the women range from subsistence farming, petty trading and hawking, wage-employment in unregulated small enterprises, or working for larger formal sector firms, in skilled work such as tailoring, weaving, embroidery and food production. With a change to market oriented economy in Myanmar, more women have been playing an important role in entrepreneurship.

Objective: To facilitate women's access to resources, employments, markets and trade.

Activities

1. Promote access to employment and improve appropriate working conditions and flexible structure to enable women to take dual responsibilities at home and at work.
2. Provide business services and training to promote access to markets, information and technology particularly for low-income women including women in the rural areas.
3. Promote women's access to saving and credit mechanisms.
4. Provide income generating programmes.

Performance Indicator

- Conduct qualitative and quantitative survey on the status of women regarding employment.

Women and the Environment

Rationale: The Programme of Action of the International Conference on Population and Development (Sept. 1994) called for the participation of women on an equal basis with man for environmental management and sustainable development. Myanmar women are aware of the environmental issues and yet they are involved in environmental degradation, often exploiting whatever natural resources they can to survive. Thus, there is a need to equip them with more knowledge. Changes in their attitudes, if necessary and changes in their behaviour must also be made so that they will protect the environment.

Objective: To enhance knowledge, measure their attitude and change their behaviour.

Recommendations

1. MAAF and other women organizations should promote more awareness both in the policy-makers and public that violence hinders women's advancement.
2. Women organizations especially MWEA should take a major role in enhancing

Activities

1. Involve women actively in environmental protection.
2. Include women in training and educational programmes.
3. Conduct a knowledge attitude and behaviour research.
4. Enhance women's awareness of the negative consequences of deforestation, and environmental pollution.
5. Find a substitute wood-fuel for cooking.

Performance Indicator

- Findings of survey on Knowledge, Attitude, Practice and Behaviour.

- knowledge on how women could balance their roles of a mother and of a worker.
3. Hold conservation activities such as tree planting ceremonies annually, cleaning campaign activities, and explain the objectives of these activities to women.

3.3.3 Uplift of Health

Lead Institution

Ministry of Health

Collaborating Institution

Ministry of Information, YCDC, INGOs and NGOs

Overview

Human health is essential for sustainable development. If human beings are not in good health, they will never have the capacity to engage in development, combat poverty or care for their environment. The importance of human health is reflected in the first principle of the Rio Declaration on Environment and Development adopted at the Earth Summit in 1992. The principle states that "Human Beings are the centre of concern for sustainable

development. They are entitled to a healthy and productive life in harmony with nature".

The Government of Myanmar recognizes the fact that improvement in health leads to overall socio-economic development in addition to bringing well-being to the people. Thus a long-term (30 years) health development plan has been drawn up to meet any future health challenges. The plan encompasses the national objectives i.e. Uplift of health, fitness and education standards of the entire nation.

Reduce Child Mortality

Rationale: In Myanmar Maternal and Child Health including new born care has been accorded priority in the National Health Plan, aiming to reduce the maternal, new born infant and children morbidity and mortality. (MNPED 2006a). The objective of this plan is to reduce the under - five mortality and infant mortality to 52/1000 LB and 40/1000 LB in 2011. In Myanmar under-five mortality rate is on the descending trend and it declined from 82.4/1000 LB in 1995 to 66.1/1000 LB in 2003. However infant mortality rate is not markedly changed and it fluctuates between 49 to 55/1000 LB.

Objective: To reduce under-five mortality to 52/1000 LB and infant mortality to 40/1000 LB in 2011.

Activities

1. Strengthen rural health department.
2. Mobilize resources for un-reached groups.
3. Have referral services for emergency care.
4. Increase women's access throughout the life cycle to appropriate affordable and quality health care, information and related services.
5. Strengthen preventive programmes that promote women's and children's health.
6. Promote research and disseminate information on women's health.

Performance Indicator

- The target set in 2011 is achieved.

Improve Maternal Health

Rationale: According to the "Nationwide Cause-specific Maternal Mortality Survey", maternal mortality ratio was estimated at 316 per 100,000 live births at the national level and 89% of all maternal deaths were reported from the rural areas. (MNPED 2006a). According to the above mentioned survey, the highest cause of maternal death is post-partum (30.98%). The 2003 Fertility and Reproductive Health (FRHS) Survey found that 67.5% of pregnant mothers were attended by skilled health personnel during delivery. Healthy Management Information System (HMIS) reported that in 2001 proportion of birth attendants by skilled health personnel is on the rise but there is still a necessity to achieve the target of MDG in 2015

regarding Maternal Mortality Ratio which now is 3.16 to 0.575 in 2015.

Objective: To reduce maternal mortality to 0.575 in 2015.

Activities

1. Strengthen community awareness on their reproductive rights.
2. Build capacity of health staff on updated knowledge.
3. Provide guidelines for midwifery practices.
4. Involve male in reproductive health programmes.

Performance Indicator

- Measure the gap between the target and attained level of performance.

Promote Access to Safe Water Supply and Sanitation

Rationale: Adequate safe water supply and proper sanitation are essential to the health of the people and also for economic development. Rapid urbanization without adequate infrastructural support and development results in poor quality housing, inadequate provision of safe water and inadequate sanitation and inadequate facilities for garbage collection.

Because inadequate water and sanitation facilities was a significant source of ill health and a constraint to economic development, the government has been implementing National Sanitation Programmes through self-help basis since 1996. National Sanitation weeks are launched throughout the country and it brings improvement to a certain extent.

Table 5: Coverage of Urban and Rural Water Supply and Sanitation

	Total	Rural	Urban	Source
Population access to safe water	78.8%	74.4%	92.1%	MICS
Population access to sanitary latrine	83.0%	81.0%	87.6%	NSW

Source: Health in Myanmar 2007.

Objective: To increase the percentage of population who has access to safe water supply and sanitation.

Activities:

1. Hold National Sanitation weeks annually.
2. Educate people on the negative impact of inadequate safe-water supply and poor sanitation facilities through media.
3. Promote collaboration and increase technical assistance and support from international agencies.

4. Conduct a technical research with participation and input from biological sciences and behavioural sciences.
5. Promote community health education.

Performance Indicator

- Proportion of population with sustainable access to improved safe water with access to improved sanitation.

Reduce Malaria Mortality Rate

Rationale: Malaria is one of the priority diseases in Myanmar. It is a re-emerging public health problem due to climatic changes, uncontrolled population migration, ecological changes, existence of multi drug resistant P. Falciparum parasite, appearance of insecticide resistant vector and change in behaviour of vector. Although the disease occurs in virtually all parts of the country the incidence is particularly high in hilly region. In the long term trend both malaria morbidity and mortality rates were declined. In 1988-1998, morbidity rate and mortality rate were 24.5/1000 population and 10.4/100,000 population respectively. In the year 2005 morbidity and mortality rate become 9.3/1000 population and 3.1/100,000 population respectively.

Objective: To reduce malaria morbidity and mortality rate.

Activities

1. Disseminating messages on malaria through media channels
2. Holding advocacy meetings with authorities at all levels.
3. Conducting early diagnosis and treatment.
4. Distributing insecticide treated mosquito nets.
5. Conducting ecological surveillance.

Performance Indicator

- Prevalence and Death rates associated with Malaria.

Reduce Tuberculosis Mortality Rate

Rationale: Tuberculosis (TB) is one of the major health problems in Myanmar and considered as the second priority disease in the National Health Plan. The increased incidence of tuberculosis and high mortality is concentrated in the economically most productive portion of the population that is the age group between 15 and 50 years. Recent estimates suggest that 1.5% of the population

become infected with tuberculosis every year, out of which 100,000 people progress to develop tuberculosis. Half of those cases are infections with positive sputum smears, spreading the disease in the country.

The National Tuberculosis Programme was established in 1966-67. It aims to reach the

interim targets of halving TB deaths and prevalence by 2010.

Objective: To reduce the mortality, morbidity and transmission of tuberculosis

Activities

1. Intensification of health education activities by using multimedia to increase awareness of TB.
2. BCG immunization to all under one year children.
3. Implementation of Directly Observed Treatment (DOT) down to the grass root level.

4. Early case detection
5. Regular supervision and monitoring of NTP at all levels.
6. Strengthening partnership with all stakeholders.
7. Capacity Building of basic health staff.

Performance Indicators

- Prevalence and death rates associated with tuberculosis.
- Proportion of tuberculosis cases detected and cured under directly observed treatment, short course.

Combat HIV/AIDS

Rationale: AIDS is one of the priority diseases included in the National Health Plan of Myanmar. The National Health Committee has laid down clear guidelines to fight AIDS as a national concern. The National AIDS Committee formed since 1989 is an active multisectoral body for formulation of National Strategic Plan to prevent and control HIV/AIDS in Myanmar. The forty-three AIDS/STD Prevention and Control teams strategically situated in all States and Divisions of Myanmar form the core of the National AIDS Control Programme.

Active surveillance for HIV and AIDS began in Myanmar since 1985. The first AIDS patient, an injecting drug user, was reported in 1991. Although Biannual HIV Sentinel Surveillance started in 1992, since 2000 the HIV Sentinel Surveillance has been conducted once a year, and it has now expanded to all States and Divisions with the sentinel sites totalling 33. The HIV sentinel subpopulation are injecting drug users, male STD patients, commercial sex workers, pregnant women attending antenatal clinics, blood donors and new military recruits. About 20,000 individuals were tested for HIV antibody each year for sentinel surveillance. Monthly HIV positive reporting of blood donors and hospital patients clinically suspected of AIDS cases were also taken into consideration in the analysis of HIV prevalence trends in the country. A sample size of 8,000 at each round was surveyed for HIV/AIDS and STD related risk behaviours. Sentinel Surveillance System is integrated by Behavioural Sentinel Surveillance System, STD (syphilis) Sentinel Surveillance.

Monthly AIDS death reporting system has already established through public hospitals.

The Ministry of Health, Myanmar and WHO Headquarter, UNAIDS and partners jointly held a workshop on 22-23 July 2004 for estimation of the number of people living with HIV and AIDS in the country. The group estimated that there were a total 338,991 people living with HIV/AIDS at the end of 2004 in Myanmar. In addition, as a result of the workshop on HIV/AIDS, projection and demographic impact analysis was also conducted during September, 2005. It was noted that HIV prevalence in Myanmar has decreased from 1.5% in 2000 to 1.3% in 2005.

Objective: To enhance HIV prevention.

Activities

1. Hold advocacy meetings
2. Raise awareness through media.
3. Enhance knowledge among community by holding small Group Meetings.
4. Hold Training for Trainers to disseminate knowledge especially on prevention among workers.
5. Conduct training to prevent HIV among reproductive age.
6. Integrate how to prevent HIV in basic education textbooks.
7. Disseminate knowledge to school going age group (out of school) through Non-Formal Education.

Performance Indicators

- The number of trainings held.
- Inclusion of HIV prevention in basic education text books.

Recommendations

1. Should involve community to take part in activities.
2. Close co-operation should be built among related stakeholders, departments and organizations to avoid overlapping and to obtain more cost effective benefits.
3. Better cooperation among partners should be promoted.
4. Health workers should be orientated with new client-centred approach.
5. Efforts should be made to promote collaboration and increase technical assistance and support from international agencies.
6. The growth of the urban population should be met through the provision of adequate housing facilities.
7. Coordination between several departments which are sharing responsibility for water and sanitation should be strengthened.
8. Prevent and control malaria by promoting personal protective measure.
9. Population migration due to socio-economic reasons need to be educated to carry the insecticide treated mosquito nets and proper use.
10. Intensify community participation.
11. Promote basic and applied field research.
12. Scale up the decentralization of the DOTS services at RHC.
13. Establish mobile teams for improvement of access to diagnostic and treatment especially to outreach area.
14. Strengthen community involvement.
15. Supervise, monitor and evaluate the trainings regularly by National AIDS Committee.

3.3.4 Culture

Lead Institution

Ministry of Culture

Collaborating Institutions

Ministry of Education, Ministry of Information, MWAF

Overview

Myanmar is famous for its rich cultural heritage and this heritage provides insights into the social, political, economic, cultural, and technical values that have fashioned Myanmar society. Movements, archaeological remains, art, literature, music, dance, language are an integral part of this heritage. Both tangible and intangible cultures are still very well maintained in Myanmar society. The Government also

adopted "Uplift of national prestige and integrity and preservation and safeguarding of cultural heritage and national character" as one of the social objectives in building a modern and developed nation. The University of Culture under the Ministry of Culture was on 24 September 1993 with the aim of promoting and preserving Myanmar's intangible established culture such as art, music and dance.

Preserve and Safeguard the Myanmar Culture and Traditions

Rationale: Myanmar, at the present moment is still maintaining its culture, that is, to obey and respect the elders, to have respect for each other, and to show kindness to young ones. This norm still prevails and incidences

such as young people attacking the elderly, the student attacking the teacher are quite unheard of. However with the advancement of information and communication technology and the impact of globalization, influence of

other cultures, especially Western culture, can be seen in the young generation. They try to adopt the behaviour of the West, especially in their attire. Thus there is a need to instill in the younger generation a keen desire to value one's culture both tangible and intangible, and to preserve and safeguard it.

Objective: To sensitize and instill the young generation to love and value one's own culture.

Activities

1. Enhance the awareness of Myanmar culture through symposiums, workshops, and mass media.
2. Hold short course on culture during school vacation for young people.

3. Provide more cultural education in curricula of Basic Education
4. Encourage community participation in preservation and safeguarding heritage programmes
5. Hold Traditional Culture performing Arts competitions annually
6. Promote Myanmar attire by holding fashion shows
7. Hold educational talks about famous Myanmar literary writers
8. Promote preservation of culture through mass media
9. Conduct research works on traditional customs of material nation races.

Performance Indicator

- Review the curricula of Basic Education, and the frequencies of activities held.

Preserving and Protection of Cultural Heritage

Rationale: Myanmar has very ancient, historical and cultural heritage sites. Ancient monuments and archaeological evidence of artifacts could be found in abundance throughout the country. The Ministry of Culture has been undertaking the works of renovation, preservation and reconstruction of ancient cities and ancient palaces in the cultural heritage sites. The excavated objects are displayed at the National Museum, and the Cultural Museums established at the historical sites. These are displayed with the aim of instilling in people the desire to cherish and value Myanmar cultural heritage.

Objective: To promote in the public especially youth the awareness of the need to preserve and protect Myanmar cultural heritage.

Activities

1. Hold seminars and workshops on preservation and restoration.
2. Disseminate knowledge and experience in preservation of cultural heritage through Media.

Performance Indicator

- Number of talks, seminars and workshops held

Protection of Cultural Properties

Rationale: To protect and preserve the Myanmar cultural heritage, archaeological laws have been promulgated and award giving ceremonies for the cultural properties found, have been held. However, in spite of these activities, most of the public are still unaware of the immense value of cultural properties and handed them over to the exploiters off handedly. Thus, there is a necessity to raise awareness among the public of the value of these cultural properties and to protect them from the hands of greedy exploiters.

Activities

1. Enhance the awareness of the value of cultural properties among public.
2. Disseminate archaeological laws through the media
3. Hold workshops and seminars to raise awareness to protect cultural properties.
4. Disseminate knowledge of how smuggling is taking place through the media, and hold talks in the community.

Objective: To protect cultural properties.

Performance Indicators:

- Number of offenses against archeological laws
- Number of ceremonies held to hand over cultural properties found.

Recommendations

1. Enhance the awareness of the value of one's own culture in a subtle way.
2. Conduct a need assessment survey before implementing intervention programmes
3. Enforce laws to protect cultural heritage.
4. Strengthen the enforcement of the law.

3.3.5 Social Development and Tourism

Lead Institution

Ministry of Hotels & Tourism

Collaborating Department

Ministry of Culture, Ministry for Progress of Border Areas and National Races and Development Affairs

Overview

Tourism contributes not only to the country's economy but also creates positive impacts on social affairs such as increase in job opportunities, building international friendship and understanding, poverty alleviation, etc. Therefore, tourism is one of the tools for poverty reductions of the Ministry of Hotels and Tourism.

The policies that are laid down by the Ministry to alleviate poverty through tourism are:

- (1) to reduce disparities among different groups,
- (2) to provide acceptable employment opportunities for disadvantaged groups,
- (3) to create new tourism related business opportunities for entrepreneurs of small and medium-sized enterprises,
- (4) to improve infrastructure in areas away from developed main destinations and commercial centres,
- (5) to contribute to revitalizing culture and tradition and preserving natural environment,
- (6) to provide income opportunities to the local communities living in rural areas and

- (7) to support the development of a framework of increased security in the area of food sufficiency, health, criminality, rights of women, children and different national races in the country.

Rationale: The objectives of the Myanmar Hotels and Tourism Law are to promote Hotel and Tourism industry systematically, to enable the tourist to study the cultural heritage and natural beauty, to safeguard the natural environment, to contribute to international friendship and to increase job opportunities. For the achievement of these objectives; policies and strategies which include principles and guidelines relating to current global tourism management, crisis management, capacity building for tourism personnel, economic, social and environmental impacts of tourism, public private partnership, pro-poor tourism development are laid down as mentioned in the overview and are being implemented.

One of the benefits of sustainable tourism development is its contribution to poverty alleviation in the rural and border areas of the

country. Myanmar is a nation with an area of 677,000 square kilometers and home to over 100 national races. Its administrative system is divided into seven states and seven divisions 64 districts and 325 townships. With a population of over 56 million, over 70 percent reside in rural areas some of which are also located in the border areas. The townships, districts, states and divisions will develop its economic and social affairs only if the rural areas, where the majority of people live, develop. In other words, the economic and social affairs of the whole country will develop only if there is progress in the rural areas, the most basic regions of the nation.

Therefore, the Ministry of Hotels and Tourism has been striving to enhance tourism development in rural areas to enhance poverty reduction.

Recommendations

1. Enhance bilateral cooperation especially between countries which share common borders to facilitate travel of tourists from both countries.
2. Promote technical and financial assistance from international organizations and agencies towards infrastructures development and capacity building at the national level.
3. Provide incentives to the private sector for infrastructure development.
4. Increase NGOs field survey in grassroots levels.
5. Promote village based and nature based tourism.
6. Provide incentives for the village-based production of low cost handicrafts as souvenirs (e.g. one village one product).
7. Develop human resource (Basic English Language skills, souvenir and handicraft making and packaging skills) provide knowledge on sustainable tourism development (positive and negative impacts).

3.3.6 Strengthening Development of Border Areas and National Races

Lead Institution

Ministry for Progress of Border Areas and National Races and Development Affairs

Collaborating Institution

Ministry of Education and others institutions

Overview

The Government of Myanmar launched the Border Area Development Plan in 1989 to fulfil basic needs of the national races residing in

Objective: To alleviate poverty through tourism

Activities

1. Promote border tourism along border areas between Myanmar and neighboring countries; China, Thailand.
2. Improve tourism related infrastructure in rural areas.
3. Promote community based ecotourism (village based tourism).
4. Promote religious, cultural and traditional festivals.
5. Promote handicraft shows, amateur painting competitions, etc.
6. Create the development of the rental of traditional non-motorized vehicles.

Performance Indicator

- Number of tourist visiting Myanmar's community-based tourism sector

remote and border areas. In 1992 a new ministry namely the Ministry of the Progress of Border Areas and National Races and

Development was established to undertake the responsibilities of border area development in collaboration with other concerned ministries.

Education has been given priority along with health transport and communications, electric power, agriculture and live stock buildings.

Providing more NFPE programmes for Border Area Development

Rationale: The aim of the government is to achieve a balanced growth throughout the whole country to narrow the disparity between mainland and remote border areas. Because of the geographical terrain of the country, it had been very difficult to develop communication with some remote border areas. However, things have changed nowadays. Bridges are

being built and thus transport and communication is no longer a problem. Literacy activities have been conducted extensively in these areas and the national races, which have been denied such opportunities for many years are now having access to promotion of reading and writing skills.

Table 6: Development Activities in Border Areas Regarding Education

Sr. No.	Development Works	1990/91	2000/01	2004/05	2005/06	2006/07 (Oct)
Education						
	Primary Schools	78	366	852	852	852
	Middle Schools	0	48	90	90	90
	High Schools	0	19	92	92	92
	Women Domestic Vocational	0	12	19	26	34

Source: MPBANRDA

The total number of literates from the year 2001 to 2006 is 53885 (MERB 2006). NFPE is equivalent to formal primary education in terms of relevant knowledge and skills.

Apart from children attending schools, NFPE programme has been provided to out-of-school children of 10 to 14 age group who have never enrolled or dropped out of school as a second chance for education.

Objective: To provide more functional NFPE to children for out-of-school children in remote border areas.

Activities

1. To train trainers from their own regions.
2. To increase number of community learning centre (CLC) and to activate the already established CLCs.
3. To monitor the literacy and functional literacy activities.
4. To review and modify the existing materials.
5. To increase the literacy rate up to 99.0% by 2015

Performance Indicators

- Literacy rate up to 99.0% by 2015

Recommendations

1. Formulate policy with special focus on NFE.
2. Strengthen national commitment to NFE
3. Build networking with NFE providers
4. Improve planning, managing, monitoring and evaluation system for NFE.



4.1 PRINCIPLES OF SUSTAINABLE DEVELOPMENT IN THE CONTEXT OF MYANMAR

In essence, sustainable development is a process of change in which the utilization of natural resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both present and future potential to meet human needs and aspirations.

Myanmar's national sustainable development strategy (NSDS) has essentially three goals, namely sustainable management of natural resources; integrated economic development; and sustainable social development.

Management of natural resources is concerned with conservation of natural resources and minimizing negative impacts primarily due to human activities on physical and biological

resources. Integrated economic development refers to the well being of the people and eradication of poverty. Sustainable social development includes access to basic needs such as health, education, human security and rights, gender equity, and culture.

Principles of Myanmar's NSDS are aligned with the principles towards achieving sustainable development endorsed by the Rio Declaration at the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro, Brazil in 1992.

The following are the principles adopted for Myanmar's national sustainable development strategy.

From the perspective of sustainable management of natural resources (environment aspect):

- Sustainable forest management (SFM) is needed for sustainable development for forests resources. Permanent forest estates (PFEs) are critical to legalize the conservation and utilization of the forest resources. Equally important is the establishment of protected areas system in order to effectively manage and conserve biological diversity;
- Policy, legal instruments and institutional frameworks of Myanmar shall be aligned with the principles of sustainable development;
- Environmental protection shall constitute an integral part of the development process. All activities and practices which could cause damage and vulnerability to the environment must be avoided and must be in harmony with nature. The environment shall be given special priority in any development activities. Environmental quality management including air and water quality management, hazardous solid waste management, etc. and enhancement are very important;
- Environment impact assessment shall be undertaken prior to major development activities to circumvent significant adverse impacts on the environment;
- The State shall enact a national land use policy for sustainable management of land resources;
- The State shall develop and conserve water sources to ensure sustainable supply of fresh water;
- All types of ecosystems shall be well conserved;
- Conservation of non-renewable energy and promotion of development of renewable energy for future energy sufficiency leading to economic growth and social uplift of the citizens should be carried out;

- The State shall conserve and utilize all above-ground and below-ground natural resources in an efficient and sustainable manner;
- Overexploitation and degradation of the natural resources should be avoided to maintain adequate and sustainable supply of all natural resources in the country for the interests of the country and for present and future generations; and
- Integrated and multi-stakeholders approach shall be applied in management of all renewable and nonrenewable natural resources and ecosystems in the country.

From the perspective of integrated economic development:

- Economic growth and activities must be sustainable in the sense that they are not harmful to the environment and social benefits of human beings;
- Economic activities must meet the timeframe, objectives and performance indicators set within the framework of the sustainable development; and
- Economic policy and activities must be in harmony with nature and be creative, and must support the market oriented economy that would lead to economic growth and sustainable development in the country.

From the perspective of sustainable social development:

- Human beings are at the centre of concerns for sustainable development. All citizens of Myanmar are entitled to enjoy a healthy and educated life;
- A knowledge-based society shall be created in the pursuit of sustainable development through human resources development and capacity-building;
- Women have a vital role and their full participation is therefore essential to achieve sustainable development; and
- Recognition and duly support of the identity, culture and interests of all national races residing in the country are crucial to fully achieve the sustainable development.

4.2 Governance Systems

Governance systems dealing with the process and implementation of national sustainable development strategy in many countries can

take several forms, which could be employed individually or in combination:

Consultative Forum

This is the most common participation modality observed in Greater Mekong Sub-region (GMS) countries. It comes in the form of oral and written comments, *and* positions and recommendations espoused in meetings and conferences organized in the course of formulation of plans or policies. This mode is

commonly used because it is politically acceptable and yet does not tie the hands of government. When government does not agree with any of the recommendations, it simply does not consider it. Nonetheless, people attain some level of satisfaction because their views are heard and solicited.

Civil Society/NGO Section or Desk

In some countries, this has become a common feature in government ministries and offices, in both sectoral (e.g. Environment, Natural Resources, Industry) and oversight (e.g. Planning, Foreign Affairs, Finance) agencies, as well as in donor agencies and private enterprises. The NGO sections usually serve as the liaison and coordinating mechanism

between the concerned ministry, agency or office and the civil society community. This modality appears to be rare, if at all present, within the GMS countries. This mode, while appearing accommodative on the part of the concerned office, is often viewed by stakeholders as highly reactive and bureaucratic.

Multi-stakeholders Mechanism

Such body could be formal or informal, standing or ad-hoc, and established at various governance levels and areas, depending on the requirements of the situation. For stability and continuity, a formal standing body such as the national council for sustainable development (NCSA) is preferred. In many cases, this body is lodged in either the environment or planning ministries or the office of the head of government (Prime Minister or President). This mode is least common because it is often seen as threatening especially to authoritarian governments, as it provides some measure of power to non-government stakeholders. It also directly exposes government to direct engagement with the stakeholders.

recommendations were received during the inception workshop and the consultation meetings. The views of all stakeholders were heard.

The NSDS project has involved meaningful participation of non-governmental organizations, civil societies and private sectors throughout the implementation process. The NSDS project has been operated along the following three driving forces.

- a. Ensure and facilitate the participation of civil and economic societies in pursuing sustainable development;
- b. Promote integration of economic, social, political, cultural, spiritual and environmental dimensions of sustainability in planning NSDS project; and
- c. Place emphasis on global environment and sustainable development agreements especially Agenda 21.

In fact, the governance system employed throughout the course of formulation of the NSDS for Myanmar is the amalgamation of the two modalities: Consultative Forum and Multi-stakeholders Mechanism. The multi-stakeholders, i.e. line ministries, NGOs, and the civil society were involved in the whole NSDS process and their comments and

The participants from different line ministries, representatives from NGOs and social organizations unanimously recommended to

institute an NCSD at the Second Consultation Meeting held from 13-14 November, 2007 in Nay Pyi Taw. To date, NCSDs in various forms exist in more than 100 countries around the world. In Asia Pacific, many countries have established such mechanisms. Some NCSDs are multi-sectoral but purely governmental (e.g., China, Nepal, and Thailand) while others are both-sectoral and multi-stakeholders (e.g., Iran, Japan, Philippines and Vietnam). Some countries have attempted to institute NCSDs but have not been successful to date (e.g., Bangladesh, Indonesia, and Sri Lanka).

The NCSD is generally recommended for the following reasons:

- NCSD created by law is more stable than one created by an executive fiat;
- NCSDs are led by the head of state or governments. Some NCSDs are led by the minister of an oversight agency such as the Ministry of National Planning and Ministry of Finance;
- Major stakeholder groups have equal voting rights and privileges;
- It is useful to have an agreed upon code of conduct and process rules;
- A technically competent and proactive secretariat is important;
- Stakeholders that are active participants of the whole formation process develop a sense of ownership and commitment to the NCSD and its agenda;

- Adequate and sustainable financial support can be available.

The NCSD would assume some or all of the following roles:

- a. Mechanism for cooperative action and forging of commitments among stakeholders;
- b. Voice for sustainability and mechanism for localizing and implementing Agenda 21 and JPOI;
- c. Advocate for holistic and integrated approach to sustainable development;
- d. Venue for discussing issues and solving problems;
- e. Vehicle for promoting education, awareness & information dissemination;
- f. Link between local and regional/global bodies; and
- g. Monitor and reviewer of national implementation of Agenda 21.

In many countries, NCSDs are led by the Head of State (President) or Head of the Government (Prime Minister) or Minister of an oversight agency such as the planning ministry. The members are ministers/deputy ministers or director-generals of the line ministries. It is important that the secretariat of NCSD should be technically competent and proactive and preferably lodged in an oversight agency. Adequate and sustainable financial support is a must for the successful implementation of an NSDS.

4.3 Mechanisms to Support Implementation Arrangement

The following procedure or a course of actions will support the implementation arrangements with a view to supporting the attainment of the

NSDS vision and the strategic objectives. The "outcomes" are the immediate effects due to the actions.

Action No. 1: Policy Framework

Objective:

To create enabling conditions for the implementation of NSDS.

Outcome 1.1:

Policy, institutional, financial and socioeconomic drivers of and barriers to sustainable development are assessed, and

appropriate measures to remove the barriers are in existence;

Outcome 1.2:

The strategies of the NSDS are incorporated into the development plans;

Outcome 1.3:

Understanding and cooperation among stakeholders at all levels are enhanced.

Action No. 2: Advocacy, Awareness Raising and Education

Objective:

To promote the concept of Sustainable Development among national, local organizations, and communities.

Outcome 2.1:

The concept of sustainable development, its principles and advantages are communicated effectively among key stakeholders at the national and local levels;

Outcome 2.2:

Utmost understanding, participation, and assistance among the stakeholders are secured;

Outcome 2.3:

The issues relevant to sustainable development such as poverty reduction, biodiversity conservation, desertification, land degradation and climate change, etc; are addressed at the fora;

Outcome 2.4:

NGOs, INGOs, Civil Society Organizations (CSOs) and scientific communities/organizations are engaged in activities such as advocacy, awareness-raising and education initiatives in the sustainable development process.

Action No. 3: Capacity-Building

Objective:

To develop capacity, duly supported by relevant national and international organizations, and to implement the proposed activities.

Outcome 3.1:

All parties concerned conduct capacity needs assessment for the implementation of national sustainable development strategy;

Outcome 3.2:

All parties concerned plan to promote capacity at the individual, institutional and systemic levels based on the needs assessment;

Outcome 3.3:

All parties promote effective and efficient utilization of natural resources in a sustainable manner;

Action No. 4: Adequate Financing and Technology

Objective:

To mobilize financial and technical resources for the smooth implementation of NSDS.

Outcome 4.1:

The national and international financing mechanisms provide adequate and timely financial resources to support initiatives to implement sustainable development strategies;

set aside a special funds or innovative sources of finance with a view to implementing the sustainable development strategy effectively;

Outcome 4.3:

Access to technology is facilitated through adequate financing, effective economic and policy incentives, and technical support by the Government and interested parties.

Outcome 4.2:

All parties involved in the implementation of sustainable development at the national level

Action No. 5: Monitoring and evaluation

Objective:

To monitor and evaluate the progress achieved relating to implementation of NSDS and its goals.

Outcome: 5.2:

Review and address the issues thus encountered;

Outcome: 5.1:

Progress report on annual basis to reflect effectiveness of NSDS and its implementation;

Outcome: 5.3:

Improve the NSDS and its implementation as and when necessary.



PART 5 |

MONITORING AND EVALUATION

5.1 ENVIRONMENTAL PERSPECTIVE

5.1.1 Sustainable Forest Resources Management (Environmental perspective)

(a) Indicators

- (1) Existence of a framework of laws, policies and regulations for sustainable forest management.
- (2) Degree of decentralized authority to territorial offices.
- (3) Sustainable harvesting and application of AACs for teak and other hardwoods and code of practice for forest harvesting.
- (4) Number and adequacy of institutions to support SFM and number of trained professionals at all levels.
- (5) Degree of participation of local communities in relation to CFIs.
- (6) Degree of public awareness about forest policies, legislations and SFM practices.
- (7) Degree of forest resource security.
- (8) The trend of forest cover. The forest cover of Myanmar out of total area of the country is 55.97% in 1990, 52.13% in 2000 and 50.205% in 2005.

(b) Monitoring & evaluation

Continuous monitoring and evaluation by responsible authorities and concerned personnel is needed on; whether the existing policies, laws and regulations are in harmony with changing situations and are these effectively imposed and implemented; whether top-down, horizontal and bottom-up approaches are harmoniously practised or not; whether sustained yield concept is still adopted or not; whether institutional capacity and

human capacity are progressively developed or not; whether public participation using CFI is satisfactory or not; the trend, in terms of the number of forest/wildlife offences in townships, is increasing or decreasing; and monitoring on conversion of natural forests into other land uses and evaluating the forest cover percentage of the country by using latest satellite images.

5.1.2 Biodiversity Conservation

(a) Indicators

- (9) Ratio of area protected to maintain biological diversity to country's surface area percentage. (1.06% in 1990, 3.77% in 2005 and 3.93% in November 2007.
- (10) Representativeness of various ecosystems of the country.
- (11) Number of protected areas connected to biological corridors.
- (12) Number of critically endangered, endangered, vulnerable, and rare species of both flora and fauna.
- (13) Existence of a strategy for in-situ- and ex-situ conservation of the genetic variation within endangered, rare and threatened species.

(b) Monitoring and evaluation

- a. Finding the ratio of area protected to maintain biological diversity to country's surface area percentage in 2008.
- b. Number of protected areas and protected areas connected to biological corridors in 2008.
- c. Number of critically endangered, endangered, vulnerable, and rare species of both flora and fauna in 2008.

5.1.3 Sustainable Freshwater Resources Management (Environmental perspective)

(a) Indicators

- (14) Percent of population with access to an improved water source (It was, 20% in 1980, 60% in 1995 and 67% in 2000). 56.5% (Rural) and 63.1% (Total) in 2000. And further improved in 2003 to 92.6% (Urban), 70.8% (Rural) and 76.1% (Total).
- (15) Proportion of people with access to improved sanitation - It was 39 % (Urban), 34% (Rural) and 35% (Total)) in 1990, and improved to 83.6 % (Urban),
- (16) Extent and percentage of total forest area managed primarily for the protection of soil and water.

(b) Monitoring and evaluation

Continuous monitoring and evaluation of percent of population with access to an improved water source; proportion of people with access to improved sanitation; and extent and percentage of total forest area managed primarily for the protection of soil and water. .

5.1.4 Environmental Quality Management and Enhancement

(a) Indicators

- (17) Carbon dioxide emission per capita. It was 1.8 metric tons per capita in 1990 and 0.725 metric ton per capita in 1997. (The effect of Myanmar to global warming and climate change on the whole is minimal on account of large area of forest cover which acts as a carbon sink. CO2 emission has yet to be updated).
- (18) Amount of consumption of ozone depleting CFCs . (The amount in 1990, 1995 and 2000 was 54.3 metric tons each year and the target for 2005 was 27.15 metric tons).

(b) Monitoring and evaluation

Continuous monitoring and evaluation of carbon dioxide emission per capita and amount of consumption of ozone depleting CFCs.

5.1.5 Sustainable Management of Land Resources (Environmental perspective)

(a) Indicators

- | | |
|------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (19) Existence of clear cut land use policy. | (23) Existence of laws and policies, rules and regulations concerning land resources to promote sustainable land resources management and to avoid overlaps and jurisdictional conflicts. |
| (20) Existence of mandatory control-schemes against soil and water erosions. | (24) Sharing with ICIMOD countries on sustainable livelihood of local communities and poverty reduction ensuring environmental sustainability. |
| (21) EIA practice before land use conversions. | |
| (22) Existence of livelihoods along with conservation programmes. | |

(b) Monitoring and evaluation

- | | |
|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| a. Effective implementation of clear cut land use policy. | d. Effectiveness of enforcement on laws and regulations concerning land resources. |
| b. Number of mandatory control-schemes against soil and water erosions. | e. Degree of collaboration with Himalayan countries to promote integrated mountain development. |
| c. Number of livelihoods along with conservation programmes. | |

5.1.6 Sustainable Management of Coastal, Marine and Island Ecosystems (Environmental perspective)

(a) Indicators

- | | |
|----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| (25) Existence of a framework of laws, policies and regulations for sustainable fishery management. | relevant regional meetings and ASEAN working groups. |
| (26) Participation and involvement in coastal, and marine environment related international conventions, | (27) Downward trends in yields of different fish species |
| | (28) Existence of marine research centres and universities. |

(b) Monitoring and evaluation

- | | |
|------------------------------------------------|------------------------------------------------------------------------|
| a. Identification of fish species at risk. | c. Effectiveness of enforcement. |
| b. Number of marine research and universities. | d. Degree of international and regional cooperation and collaboration. |

5.1.7 Sustainable Management of Eco-Tourism (Environmental perspective)

(a) Indicators

- | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| <p>(29) Existence of rules and regulations of Myanmar Hotel and Tourism Law.</p> <p>(30) Existence of a framework of laws, policies and regulations for ecotourism, avoiding misinterpretation of it.</p> | <p>(31) Existence of community-based ecotourism.</p> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|

(b) Monitoring and evaluation

- | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| <p>a. Degree of effectiveness of Myanmar Hotel and Tourism Law.</p> <p>b. Degree of effectiveness of enforcement, regarding regulations for ecotourism.</p> | <p>c. Level of income generated from community –based ecotourism activities.</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|

5.1.8 Sustainable Management for Mineral Resources Utilization (Environmental perspective)

(a) Indicators

- | | |
|---------------------------------------------------------------|------------------------------------------------------------------------------------|
| <p>(32) Existence of EIA procedure for mining operations.</p> | <p>(33) Existence of Life Cycle Analysis (LCA) procedure for mineral products.</p> |
|---------------------------------------------------------------|------------------------------------------------------------------------------------|

(b) Monitoring and evaluation

- | | |
|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| <p>a. Continuous monitoring and evaluation of EIA in mining operations.</p> | <p>b. Continuous monitoring and evaluation of LCA procedure in mining industries.</p> |
|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------|

5.1.9 Sustainable Management of Agriculture, Livestock and Fisheries (Environmental perspective)

(a) Indicators

- | | |
|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| <p>(34) Adoption of vertical approach in raising agricultural productivity.</p> <p>(35) Existence of formal pasture land use.</p> | <p>(36) Existence of EIA practice prior dam constructions.</p> |
|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|

(b) Monitoring and evaluation of

- | | |
|------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| <p>a. Deforestation rate on account of agricultural expansion.</p> <p>b. Pasture land use in practice.</p> | <p>c. EIA practice throughout dam construction period.</p> |
|------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|

5.1.10 Sustainable Energy Production and Consumption (Environmental perspective)

(a) Indicators

(37) The energy consumption per GDP in Kg of oil equivalent per 1000 Kyat was 57.35 KgOE in 1990-91 and 3.95 KgOE in 2000-01. And net domestic

consumption per year was gradually increasing from 8714 KTOE in 1990-91 to 11979.5 KTOE in 2005-06.

(b) Monitoring and evaluation

Continuous monitoring and evaluation on GDP per unit of energy use (as proxy for energy efficiency).

5.1.11 Sustainable Industrial, Transport and Communication Development (Environmental perspective)

(a) Indicators

(38) Introduction of cleaner production techniques and technology.

(39) Facilities for disposal of hazardous wastes from industrial processes.

(40) Existence of mechanisms to ensure that existing and future industries are environmentally sound, competitive and profitable.

(41) Increased international cooperation and collaboration.

(42) Development of transportation and telecommunications infrastructure in order to support sustainable economic and social development.

(43) Incorporation of environmental protection measures in transport and communications development.

(b) Monitoring & evaluation

Continuous monitoring and evaluation by responsible authorities and concerned personnel is needed on: cleaner production techniques and technology; facilities for disposal of hazardous wastes from industrial processes; mechanisms to ensure that existing and future industries are environmentally

sound, competitive and profitable; increased international cooperation and collaboration; transportation and telecommunications infrastructure in order to support sustainable economic and social development; and environmental protection measures in transport and communications development.

5.2 ECONOMIC PERSPECTIVE

There are sixty-two indicators to measure the performances of economic development in the context of National Sustainable Development Strategy in Myanmar. The performance indicators in economic prospect signalize the status of each and every sub-sector.

Consecutive observation on the economic performance indicators supports to monitor the performances. And interpretation on the results from monitoring provides to evaluate the past experiences of the national economy.

5.2.1 Reasonable Macroeconomic Performance

(a) Economic Growth

- (1) **Sectoral Production in Real Term:** The indicator informs total production of each of economic sectors computed in constant price which reflects the price of certain based-year. A selected sector may produce more in current price compared to previous period but may lessen when they are compared in constant price. If so, the sector can be assessed as being downward.
- (2) **Real GDP Growth Rate:** Year on year rate of GDP growth is to be computed in real term by using constant price. Continuous and high GDP growth rate tends to economic sustainability.
- (3) **Per Capita GDP in Real Term:** It is average production of each person in a country whereas GDP in real term is shared by total population. Per capita GDP is weak to reflect income distribution.
- (4) **Per Capita GDP in PPP:** From the purchasing-power-parity (PPP) point of view, per head production is computed in capacity to buy the same quantity of goods in other countries. The indicator is generally used to measure the living standard through purchasing power of average income.
- (5) **Investment to GDP Ratio:** It is the proportion of total investment against GDP. Total investment derives from domestic savings and foreign savings including foreign borrowing and investment. High investment rate is frequently an important phenomenon of industrialized countries.

(b) Price Stability

- (6) **CPI/Inflation Rate:** The Consumer Price Index (CPI) is a measure of the overall cost of the goods and services bought by a typical consumer. CPI is used to calculate inflation rate which refers to the percentage change in the price index from the preceding period. High inflation discourages savings and encourages speculation which harms to price stability.
- (7) **Growth in Money Supply:** Money supply constitutes the quantity of money available in the economy. The growth of money supply in a country is suggested to be in line with its economic growth. Excessive money supply leads to inflation.
- (8) **M1 to GDP Ratio:** M1 represents money stock comprising currency in circulation and demand deposits at the financial institutions. High ratio of M1 to GDP explains the economy as the cash-base society which make easier be inflation.
- (9) **M2 to GDP Ratio:** M2 represents money stock comprising everything in M1 plus savings/time deposits.

(c) Employment Opportunity

- (10) **Unemployment Rate:** Unemployment rate is the percentage of unemployed population against the total labour force within a country. There is the minimum rate of unemployment that cannot be wiped out. Such persons as those who dropped the old jobs and look for the new ones are temporarily unemployed, and this rate of unemployment has the tendency to persist in every economy.
- (11) **Employment Creation Rate:** This is the ratio of new job opportunities and existing employments over a given year.

(d) International Trade

- (12) **Term of Trade:** It is the ratio of the two separate indexes – one for export prices and one for import prices. When the export prices for a country rise quickly in comparison to the import prices, the terms of trade for such a country are said to be favourable.
- (13) **Structure of Export:** The structure of export explains the development status of an economy. Dominating raw materials and resources in the export is phenomena of less developed countries.
- (14) **Structure of Import:** The import structure includes consumer goods, intermediate goods and capital goods. Larger proportion of import for intermediate and capital goods suggests the transformation to industrialized country.

5.2.2 Sustainable Agricultural Development

(a) Sustained Increase of Overall Agricultural Production

- (15) **Ratio of Use of High Yield Variety:** For each and every crop, sown acreage using high yield variety (HYV) to total cultivated areas of certain crop is usable to predict production trend.
- (16) **Irrigated Area:** Absolute irrigated area, the increment of irrigated area from time to time, and the ratio of irrigated area to total cultivable area are signs of capability for multiple cropping.
- (17) **Number of Farm Machineries in Action:** Growth of farm machineries indicates the level of mechanized farming.
- (18) **Use of Chemical Fertilizer, Bio-fertilizer, Neem and Pesticide in Each Crop per Unit Acre:** On an average, higher use of chemical fertilizer contributes higher outputs in a short-run and higher use of bio-fertilizer contributes in a sustainable basis. The use of neem and pesticide do as well.
- (19) **Effective Area in Organic Farming:** Increasing demand for organic products in the current world calls for agrarian countries like Myanmar to emphasize organic farming.
- (20) **Seasonal Loan per Unit Acre:** Farm subsidies are still in priority even in the developed countries to encourage farm production. Seasonal loans for important crops are supported in Myanmar, and the tendency of loan disbursement per unit acre shows the government's enforcement to increase agricultural produces.

(b) Surplus in Paddy Production

- (21) **Yield per Acre in Paddy Production:** Yield per acre in time series, in comparison with targeted yield as well as with yields of other rice producing countries help to see the prospect to fulfill the first objective of agriculture as to be surplus in paddy production.
- (22) **Price Incentive to Produce Rice:** Price incentives such as reasonable return on investment and larger net income compared to other crops could encourage farmers to grow paddy more.

(c) Self-sufficiency in Edible Oil Production

- (23) **Edible Oil Import to Consumption Ratio:** The Ministry of Agriculture and Irrigation aims to be self-sufficiency in edible oil production as the second objective. Monitoring the import to consumption ratio for edible oil could advise the gap to domestically produce.

- (24) **Edible Oil import to Total Import Ratio:** Myanmar needs to reduce edible oil import which is about 5 percent of total imports and 12 percent of

consumer goods imports. So, the ratio could be reviewed to evaluate the improvement of internal supply.

(d) Increased Production and Export of Pulses and Industrial Crops

- (25) **Production in Term of Volume:** The third objective of proper agriculture is to increase production and export of pulses and industrial crops. The yearly production volume of pulse and bean and each of industrial crops is useful to assess the enlargement of potential crops.
- (26) **Export Share:** The proportion of pulses and bean and industrial crops export to total export shows the importance of these crops in the country's trade. Increasing export share could be

concluded that the objective is practically realized.

- (27) **Revealed Comparative Advantage (RCA) of Each Product:** Although the objective drives to increase production and export of pulses and industrial crops, only some selected crops have competitive advantage in the world market. In order to specialize in production of the crops with more comparative advantage, RCA of each crop are to be worked out to assess the results.

5.2.3 Sustainable Livestock and Fisheries Development

(a) Increase of Livestock and Fisheries Production

- (28) **Total Production of Livestock:** Continual monitoring on the aggregate production of livestock assists to evaluate the condition of egg and meat fulfillment.
- (29) **Total Production of Fish and Prawn:** Continual monitoring on the aggregate production of fish and prawn assists to evaluate the condition of fulfillment of fishery products.
- (30) **Per Capita Consumption of Meat:** Aggregate production explains only

absolute volume produced. Per capita consumption is the indicator which takes into account the population growth. Normally, lower growth of meat production against population growth tends to decrease in per capita meat consumption.

- (31) **Fishery Export:** Marine products are included in the major export items of Myanmar. The development of fishery product export is a signal of increased production in fishery sector.

(b) Sustainable Fishery Production

- (32) **Comparative Production of Fish Between Nature and Culture:** Extraction of resources such as fish from the nature all the time cannot be sustainable. Fish are renewable resources so that restoration and expansion of these resources are a must. Higher production from

aquaculture than that from nature could lead to sustainable production.

- (33) **Per Capita Production of Fish:** The indicator of per capita production rather than absolute volume of production in fishing is important to assess sustainable yield in line with population growth in fishery sector.

5.2.4 Sustainable Forest Development

(a) Develop the Forestry Sector to Meet Basic Needs and Targeted Income

- (34) **Net Output from Forestry:** In order to examine the provision of sufficient wood and non-wood forest products for the general public, net forestry outputs are to be inspected regularly.
- (35) **Export Earnings Received from Forestry:** To accomplish targeted income of forestry sector, the revenues from export of forestry products are major source. Volume and trend of export earnings from forestry sector give the information and estimation to meet the target.

(b) Accelerate Sustainable Development of Forest Resources

- (36) **Net Outturn from Forest Sector:** Making comparison the outturn from forest with maximum sustainable yield contributes to evaluate forest sustainability.
- (37) **Annual Replacement Acreage:** Wider annual replacement area than annual logging area suggests the improvement of forest coverage. The replacement, however, should reflect survival rate.
- (38) **Percentage of Forest Covering Area:** Frequent observation on forest covering area could say the preservation of forest resources.

(c) Promote Efficiency in Production of Goods and Services from the Forest

- (39) **Waste to Net Output Ratio:** Due to lack of advanced technologies, high wastage to net output is experienced in many developing countries' forestry sector. Lower waste ratio indicates higher efficiency of extraction.
- (40) **Value-added to Initial Outturn Ratio:** This is the ratio of additional value made by such as wood-based industries and input value such as round logs. Higher value-added ratio indicates higher efficiency of production.

5.2.5 Sustainable Energy Development

(a) Increase Energy Production and Consumption:

- (41) **Total Supply of Primary Energy:** All types of energy, both renewable and non-renewable, include the primary energy, and they all need to be converted into oil equivalent tonnage. Larger supply of primary energy in a given period shows the growth in general.
- (42) **Per Capita Energy Consumption:** Average energy consumption within certain population is more reliable to conclude whether the energy sector is growing. If there is growth of energy provision larger than growth of population, there will be net growth in energy sector.

(b) Boost Electric Power Installation, Generation and Consumption

- (43) **Total Power Generation:** More electric power generation tends to provide public demand in an increasing trend.
- (44) **Per Capita Power Consumption:** It is more meaningful to assess adequacy of electricity infrastructure in a country, and to compare with the other countries.

(c) Maintain Energy Resources for Future Generations

- (45) **Annual Energy Production from Various Types of Resources:** The information about which sources such as hydro, wind, tidal, nuclear, coal and fossil oil generate how much extent of energy reveals the extraction of resources for energy production. Complete extraction of energy from the renewable resources is a sign of maintaining non-renewable energy resources in the resource-rich countries like Myanmar.
- (46) **Renewable Energy Production to Total Energy Production Ratio:** High dependence on non-renewable energy cannot sustain energy resources in a long-run as well as for the next generations.

5.2.6 Sustainable Mining Sector Development**(a) Fulfill Mineral Resources to Local Industries and Promote Export**

- (47) **Net Production in Mining Sector:** Net mineral production comparing with local industries' need shows that whether there is supply gap or demand gap. It is useful to project expansion of mineral-based industries and export.
- (48) **Export of Mineral Product:** Unit price of mineral export derives from export of mineral product in terms of volume and value. It is desirable whereas higher income received from a given amount and consequent high unit price.

(b) Prolong Sufficient Reserve of Mineral Resources

- (49) **Annual Production in Mining Sector:** Year on year extraction of mineral resources is to be adjusted with maximum sustainable yield.
- (50) **Potential Reserve of Mineral Resources:** Persistent monitoring on each type of mineral resources to identify their potential reserve is essential to maintain stable base.
- (51) **Value-Added to Raw Materials Ratio:** As usual, mining sector has its income target to be implemented. Higher ratio of value-added to raw materials indicates increasing income within a given resource use or reduced resource use for certain income.

5.2.7. Sustainable Industrial Development**(a) Enhance Industrial Sector Development**

- (52) **Structure of the Economy:** The economic structure (i.e. GDP) of every country consists of the production from three main sectors: primary (agriculture), secondary (industry) and tertiary (service) sector. Percentage share of secondary sector indicates the development stage of industrialization.
- (53) **Production from Manufacturing Sector:** Value of production from manufacturing from time to time generally shows expansion or contraction in industrial sector.
- (54) **Export of Manufacturing Product:** Export earnings and export volume from manufacturing sector usually state the movement of the sector.

(b) Introduce Cleaner Production and Greener Products

- (55) **Number of Firms Awarded the Environment Related ISO Certificate:** ISO fourteen thousand series are designed by International Standard Organization to award various industries for their ability to apply environmental friendly practice. Increasing number of firms awarded such certificates ensures cleaner production and greener products.
- (56) **Number of Firms with Air and Waste Water Treatment Facility:** Firms in each industrial zone are instructed to treat disposal in a systematic way. It needs to assess how many firms have already engaged in air and waste water treatment facilities in order to reduce risks to human and environment.

5.2.8. Sustainable Transportation and Communication Development

(a) Develop Transport and Communication Infrastructure in a Sustained Basis

- (57) **Paved Road Length per 1,000 Square Kilometres:** The indicator is to be compared periodically as well as to other countries in order to assess the development of road infrastructure.
- (58) **Rail Road Track Length per 1,000 Square Kilometres:** It is the same as preceding indicator to investigate the progress of rail road infrastructure.
- (59) **Number of Post Office per 100,000 People:** Post offices are still centres of communication for most part of developing countries like Myanmar. Enhancement of post offices per designated people is sign of increase in communication service.
- (60) **Telephone Subscribers per 1,000 People:** The indicator about how many people out of 1,000 are accessible for telecommunication can be weighed against previous periods as well as against the status of the other countries.

5.2.9. Sustainable Tourism Development

(a) Enhance Service Sector through Tourism Development

- (61) **Number of Tourists visited to Myanmar:** Time series assessment as well as cross sectional assessment can be made to compare with what went before and with the countries in the region.
- (62) **Total Income from Tourism Sector:** By analyzing the tendency of tourism income and the contribution to the whole service sector reveals the importance of tourism in the economic growth.

5.3 SOCIAL PERSPECTIVE

Twenty four performance indicators are presented to measure the performance of social development. Evaluation of whether the activities in each sector promote the social

development will be interpreted on the findings of systematic consecutive observation in the monitoring process.

5.3.1 Create a Knowledge-based Society

(a) Completion of Basic Education by all citizens

- (1) **Measure the gap between the target and attained level of performance:** Myanmar has drawn a "Thirty Year Long Term Plan" for Basic Education Sector with the goal to transform the whole society of Myanmar with a constant learning society. This 30 year plan has

been divided into six short "Four Year Plan" stating the target to be achieved. Assessment at the end of each four year on the gap between the target and attained level of performance will indicate whether there is development in this sector.

(b) Enhancement of awareness of environmental education at all levels

- (2) **Review the Curricula of Basic Education :** Although topics related to protection of environment have been included in the basic education textbooks there is still a need to enhance the awareness regarding this issue. Thus, there is a need to review the curricula by not only by Ministry of

Education but also by the related ministries and NCEA.

- (3) **Measure the environmental education through surveys :** This indicator will disclose how much the students have attained the knowledge of preserving, conserving and utilizing the environment in a sustainable manner.

(c) Achieving Gender Equality and Parity

- (4) **Number of gender awareness training :** In Myanmar, as in most countries, people are still confused with the term "gender" and is not much aware of it. The number of "gender awareness trainings will prove that awareness is

being enhanced and will lead to achieved equality.

- (5) **More gender equity in textbooks :** This indicator will indicate the number of materials of non-stereotype images of girls in textbooks i.e. stories regarding female role models.

(d) Life skills and Life long Learning through Non-Formal Education (NFE)

- (6) **Measure the gap between the target and attained level of performance :** The target set for Community-based Continuous Education and Learning (EXCEL) for the year 2015 is 50,000 out

of school young people is 46 townships. By measuring whether there is a gap between the target and attained level of performance will show the development in education sector.

(e) Disseminate Advanced ICT in Tertiary Education

- (7) **Review the activities :** Measures have been taken in both Basic and Tertiary education with the aim to enhance the knowledge

of ICT. Reviewing the activities will show whether the aim has been achieved.

5.3.2 Vulnerable Group: Women

(a) Reducing violence against women

- (8) Measure the incidence of violence against women** : Comparison of the yearly statistics collected through research, judicial courts, hospitals will point out whether incidence of violence

against women decreases. This decrement can be interpreted as being due to society's awareness that violence hinders women's advancement.

(b) Women and the Economy

- (9) Conduct qualitative and quantitative survey on the status of women regarding employment** : There is no real statistics to show the number of women in the labour force as a very

high proportion of all female employment is absorbed by the informal sector. The above indicator will, to a certain extent present the status of women in the labour force.

(c) Women and the Environment

- (10) Findings of survey of Knowledge, Attitude, Practice and Behavior (KAPB)** : A KAPB study will reveal how much

the women know and practice regarding environmental protection.

5.3.3 Uplift of Health

(a) Reduce Child mortality

- (11) The target set is achieved** : The target set to reduce the under-five mortality and infant mortality is 52/1000 LB and

40/1000 LB respectively in 2011. If they are achieved in 2011, there is definitely a development in the health sector.

(b) Improve Maternal Health

- (12) Measure the gap between the target and attained level of performance** : The target set to reduce the maternal Mortality Ratio is 0.575 in 2015. Even if the target is not achieved, the

narrowing of the gap between the target and attained level of performance will reveal the development in the health sector.

(c) Promote Access to Safe Water Supply and Sanitation

- (13) Proportion of population with sustainable access to improved safe water with access to improved sanitation** : National Sanitation Programmes through self-help basis has been implemented since 1996 and statistics have been collected annually

on the coverage of Urban and Rural Water Supply and Sanitation. This statistics which shows the proportion of population with sustainable access to improved safe water and sanitation will indicate the development of health sector.

(d) Reduce Malaria Mortality Rate

(14) Prevalence and Death rates associated with Malaria : Statistics regarding morbidity and mortality rates have declined through these years.

Monitoring on the yearly statistics is a good indicator to evaluate the activities.

(e) Reduce tuberculosis Mortality Rate

(15) Prevalence and death rates associated with tuberculosis : National Tuberculosis Programme aims to reach the interim targets of halving TB deaths and prevalence by 2010. The statistics will reveal whether it has been reached.

(16) Proportion of tuberculosis cases detected and cured under directly observed treatment, short course : DOTS treatment has proved to be successful in treating Tuberculosis patients. The above indicator can disclose more vividly of the success of this services.

(f) Combat HIV/AIDS

(17) The number of trainings held : Training for Trainers to disseminate especially on prevention among workers, and trainings to prevent HIV among reproductive age are effective strategies in combating HIV/AIDS. Thus the number of trainings implemented played an important role.

(18) Inclusion of HIV prevention in basic education textbooks : To enhance prevention of HIV infection the adolescents at the schools must have the knowledge regarding HIV. Reviewing of the textbook will reveal whether HIV prevention is included in it.

5.3.4 Culture

(a) Preserve and Safeguard the Myanmar Culture and Traditions

(19) Review the curricula of Basic Education, and the frequencies of activities held: It is important to sensitize and instill the young generation to love and value one's own

culture. The Inclusion of topics regarding culture in textbooks and the number of cultural activities held will be an important factor.

(b) Preserving and Protection of Cultural Heritage

(20) Number of talks, seminars and workshops held : The excavated cultural artifacts from the historical sites are displayed at National Museum and Cultural Museum with the aim that people will learn to cherish and value Myanmar cultural heritage. However, people will not learn to cherish it by just looking at it. They will learn to

cherish it only if they attained the knowledge of the background of these artifacts. Thus the number of talks, seminars and workshops held will indicate the success in promoting the public to cherish and value Myanmar cultural heritage.

(c) Protect of Cultural Properties

(21) Number of offenses against archeological laws : The Government of Myanmar has promulgated Antique Objects Act Law No 15/07 and Antique Objects Amending Law, Law No 28/62 and Protection and Preservation of Cultural Heritage Region Law, Law No 9/98. Action has been taken against the offenders of these laws. If the number of offenses decrease as the years go by,

it indicates that people are protecting cultural properties.

(22) Number of ceremonies held to hand over of cultural properties : Prize giving ceremonies honouring the persons who hand over the cultural properties they found to the Government are held in the country. The number of ceremonies is a good indication of showing people's love and value regarding cultural properties.

5.3.5 Social Development and Tourism

(a) Poverty Alleviation through Tourism

(23) Number of tourist visiting Myanmar's community-based tourism sector : Tourism contributes not only international friendship but increased job opportunities which can alleviate poverty. And also by improvising the

tourism related infrastructure in rural areas, there will be development and progress in these areas. The success of this sector will be revealed by the number of tourists visiting the country.

5.3.6 Strengthening Development of Border Areas and National Races

(a) Providing more Non Formal Primary Education for Border Area Development

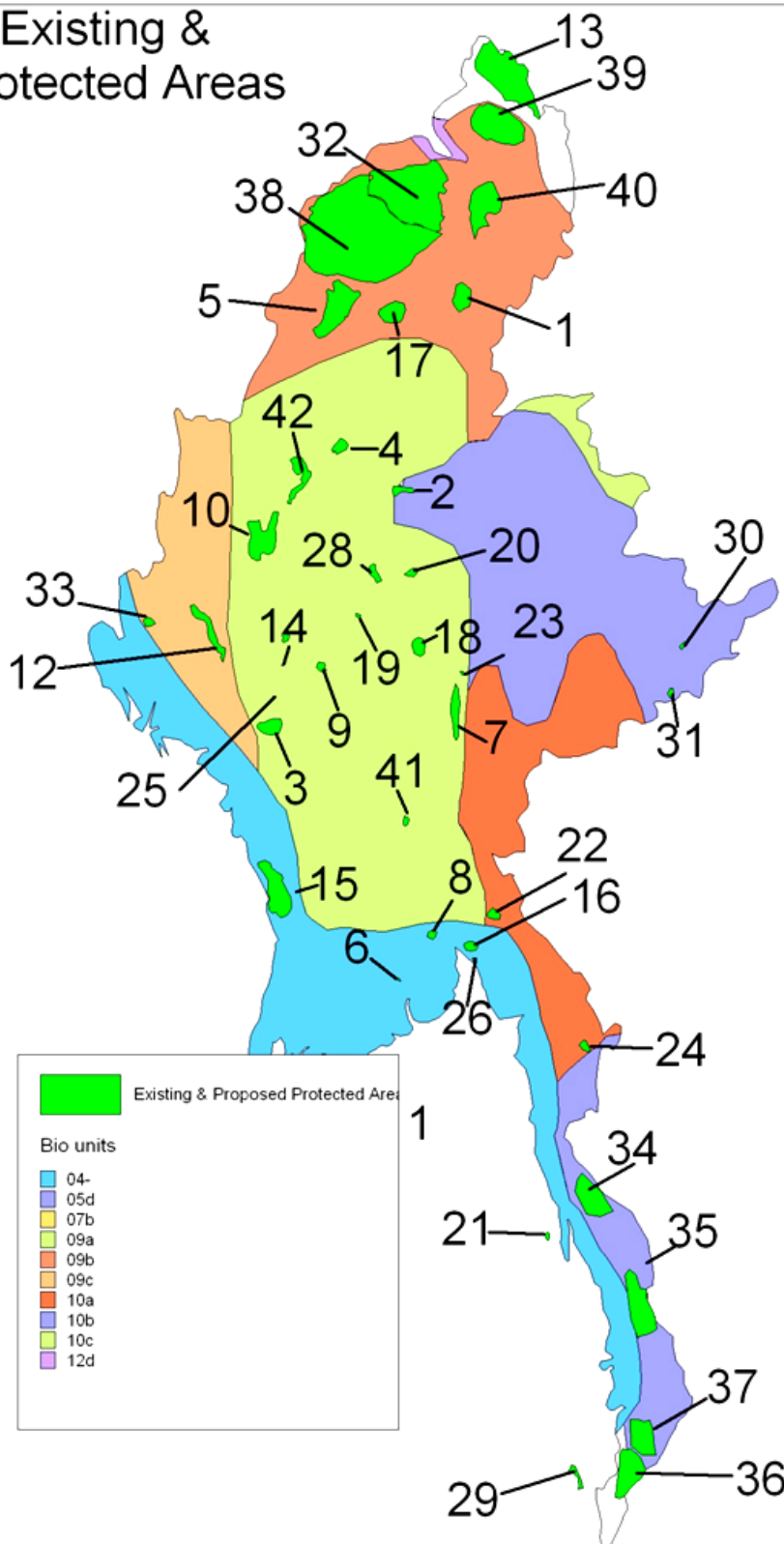
(24) Literacy rate up to 99% by 2015 : The aim of the government is to provide Non Formal Primary Education (NFPE) programmes for out of school as a

second chance for education. Increment of literacy rate year by year will indicate the success of the activities.

APPENDIX-1

Locations of Existing & Proposed Protected Areas in Myanmar

S_No_	Name
1	Pidaung W.S
2	Shwe-U-Daung W.S
3	Shwesettaw W.S
4	Chaitin W.S
5	Htamanthi W.S
6	Hlawga Wildlife Park
7	Inlay Bird Sanctuary (Wetland)
8	Moyungyi Bird Sanctuary (Wetland)
9	Popa Mountain Park
10	Alaungdaw Kathapa N.P
11	Meinmahla Kyun W.S
12	Natmataung N.P
13	Hkakaborazi N.P.
14	Lawkananda W.S
15	Rakhine Yoma Elephant Range
16	Kyaik-Hti-Yo W.S
17	Indawgyi W.S
18	Panlaung-Pyadalin Cave W.S
19	Minsontaung W.S
20	Pyin-Oo-Lwin Bird Sanctuary
21	Moscos Island W.S
22	Kahilu W.S
23	Taunggyi Bird Sanctuary
24	Mulayit W.S.
25	Wethikan Bird Sanctuary
26	Kelatha W.S
27	Thamihla Kyun W.S
28	Minwun-Taung W.S
29	Lampi Islands Marine N.P
30	Loimwe Protected Area
31	Parsar Protected Area
32	Hukaung Valley W.S
33	Ktaukpan Taung W.S
34	Taninthayi N.R
35	Taninthayi N.P
36	Lenya N.P
37	Lenya N.P (Extension)
38	Hukaung Valley W.S (Extension)
39	Hpongan Razi W.S
40	Bumhpabum W.S
41	Shinpinkyatthauk W.S
42	Maharmying W.S



Source: FD & BANCA

APPENDIX-2

**Table 7. Progress Towards the Millennium Development Goals and Targets, Myanmar
(As of November 2007)**

Goals and Targets	Status
Goal 7: Ensure Environmental Sustainability	
<p>Target 9: Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources.</p> <p>Indicator 25. Proportion of land area covered by forest</p> <p>Indicator 26. Land area protected to maintain biological diversity</p> <p>Indicator 27. GDP per unit of energy use (as proxy for energy efficiency)</p> <p>Indicator 28. Carbon dioxide emissions (per capita) [Plus two figures of global atmospheric pollution: ozone depletion and the accumulation of global warming gases]</p>	<p>The forest cover of Myanmar out of total area of the country is 55.97% in 1990, 52.13% in 2000 and 50.205% in 2005. Myanmar Agenda 21 was formulated and passed in 1997.</p> <p>Ratio of area protected to maintain biological diversity to surface area percentage is 1.06% in 1990, 3.77% in 2005 and 3.93% in November 2007. (However altogether there are 42 notified and proposed protected areas covering 7.3% or the total country's area).</p> <p>The energy consumption per GDP in Kg of oil equivalent per 1000 Kyat was 57.35 KgOE in 1990-91 and 3.95 KgOE in 2000-01. And net domestic consumption per year was gradually increasing from 8714 KTOE in 1990-91 to 11979.5 KTOE in 2005-06.</p> <p>Carbon dioxide emission was 0.9 metric tons per capita in 1990 and 0.725 metric ton per capita in 1997. (The effect of Myanmar to global warming and climate change on the whole is minimal on account of large area of forest cover which acts as a carbon sink. CO2 emission has yet to be updated).</p> <p>Consumption of ozone depleting CFCs in 1990, 1995 and 2000 was 54.3 metric tons each year and the target for 2005 was 27.15 metric tons.</p>
<p>Target 10: Halve, by 2015, the proportion of people without sustainable access to safe drinking water</p> <p>Indicator 29. Proportion of population with sustainable access to an improved water source</p>	<p>Percent of population with access to safe drinking water was 38% (Urban), 30% (Rural) and 32% (Total) in 1990; in 2000, the percentages were 89% (Urban), 66% (Rural) and 72% (Total); and in 2003, 92% (Urban), 74%(Rural) and 79%(Total). The numbers suggest substantial progress, and attainment of the target ahead of schedule.</p> <p>Percent of population with access to an improved water source was, 20% in 1980, 60% in 1995 and 67% in 2000</p>
<p>Target 11: By 2020, achieve a significant improvement in the lives of at least 100 million slum dwellers.</p> <p>Indicator 30. Proportion of people with access to improved sanitation</p> <p>Indicator 31. Proportion of people with access to secure tenure</p>	<p>Proportion of people with access to improved sanitation was 39 % (Urban), 34% (Rural) and 35% (Total)) in 1990, and improved to 83.6 % (Urban), 56.5% (Rural) and 63.1% (Total) in 2000. And further improved in 2003 to 92.6% (Urban), 70.8% (Rural) and 76.1% (Total).</p> <p>There were 248,762 housing sites and services between 1989 and 2000. There were 10 low cost housing projects in 7 townships of Yangon Districts with 3388 residential units between 1989 and 2000.</p> <p>'From hut to apartment project' was implemented between 1989 and 2006. Out of 41 housing projects, there were 12671 residential units in 13 townships of Yangon Districts.</p>

Source: Myanmar MDG Report 2006, MNPED; MOF (2001b)

APPENDIX-3

Table 8. Indicators to Look at Economic Development in Myanmar

Theme	Sub-theme	Indicator
1. Reasonable Macroeconomic Performance	1.1. Economic Growth	- Sectoral Production in Real Term - Real GDP Growth Rate - Per Capita GDP in Real Term - Per Capita GDP in PPP - Saving Ratio
	1.2. Price Stability	- CPI/ Inflation Rate - Growth in Money Supply - Currency in Circulation and Demand Deposit to GDP Ratio (M1/GDP) - M1 + Time Deposit to GDP Ratio (M2/GDP)
	1.3. Employment Opportunity	- Unemployment Rate - Employment Creation Rate
	1.4. International Trade	- Term of Trade - Structure of Export - Structure of Import
2. Sustainable Agricultural Development	2.1. Sustained Increase of Overall Agricultural Production	- Ratio of Use of High Yield Variety. - Irrigated Area. - Number of Farm Machineries in Action. - Use of Chemical Fertilizer, Bio-fertilizer, Neem and Pesticide in Each Crop per Unit Area. - Effective Area in Organic Farming. - Seasonal Loan per Unit Acre
	2.2. Surplus in Paddy Production	- Yield per Acre in Paddy Production. - Price Incentive to Produce Rice.
	2.3. Self-Sufficiency in Edible Oil Production	- Edible Oil Import to Consumption Ratio. - Edible Oil Import to Total Import Ratio.
	2.4. Increased Production and Export of Pulses and Industrial Crop	- Production in Term of Volume. - Export Share. - Revealed Comparative Advantage (RCA) of Each Product.
3. Sustainable Livestock and Fisheries Development	3.1. Increase of Livestock and Fisheries Production	- Total Production of Livestock. - Total Production of Fish and Prawn. - Per Capita Consumption of Meat. - Fishery Export.
	3.2. Sustainable Fishery Production	- Comparative Production of Fish between Nature and Cultivation - Per Capita Production of Fish

Theme	Sub-theme	Indicator
4. Sustainable Forest Development	4.1. Develop the Forestry Sector to Meet Basic Needs and Targeted Income	- Net Output from Forestry - Export Earnings Received from Forestry
	4.2. Accelerate Sustainable Development of Forest Resources	- Net Outturn from Forest Sector - Annual Replacement Acreage - Percentage of Forest Covering Area
	4.3. Promote Efficiency in Production of Goods and Services from the Forests	- Waste to Net Output Ratio. - Value-added to Initial Outturn Ratio.
5. Sustainable Energy Development	5.1. Increase Energy Production and Consumption	- Total Supply of Primary Energy. - Per Capita Energy Consumption.
	5.2. Boost Electric Power Installation, Generation and Consumption	- Total Power Generation. - Per Capita Power Consumption.
	5.3. Maintain Resources of Energy for Future Generation	- Annual Energy Production by Various Types of Resources. - Renewable Energy Production to Total Energy Production Ratio.
6. Sustainable Mining Sector Development	6.1. Fulfil Mineral Resources to Local Industries and Promote Export	- Net Production in Mining Sector. - Export of Mineral Products.
	6.2. Prolong Sufficient Reserve of Mineral Resources	- Annual Production in Mining Sector. - Potential Reserve of Mineral Resources. - Value Added to Raw Minerals Ratio.
7. Sustainable Industrial Development	7.1. Enhance Industrial Sector Development	- Structure of the Economy. - Production from Manufacturing Sector. - Export of Manufacturing Products.
	7.2. Introduce Cleaner Production and Greener Products	- Number of firms awarded the environment related ISO Certificate. - Number of Firms with Air and Waste Water Treatment Facility
8. Sustainable Transportation and Communication Development	8.1. Develop Transport and Communication Infrastructure in a Sustained Basis	- Paved Road Length Per 1,000 Square Kilometres. - Rail Road Track Length Per 1,000 Square Kilometres. - Post Office Per 100,000 people. - Telephone Lines Per 1,000 People.
9. Sustainable Tourism Development	9.1. Enhance Service Sector through Tourism Development	- Number of Tourists Visited to Myanmar. - Total Income from Tourism Sector.

APPENDIX-4

Table 9. Indicators to Look at Social Development in Myanmar

Theme	Sub-theme	Indicator
Create a Knowledge Based Society	<ul style="list-style-type: none"> - Completion of Basic Education by all Citizens - Enhancement of Awareness of Environment Education at all Levels - Achieving Gender Equality and Parity - Life Skills and Lifelong Learning through Non-Formal Education - Disseminate Advanced ICT in Tertiary Education 	<ul style="list-style-type: none"> - Measure the gap between the target and attained level of performance. - To review the curricula of Basic Education and to measure the environmental education through surveys - To review the learning environment - Measure the gap between the target and attained level of performance - Reviewing the activities
Vulnerable Group: Women	<ul style="list-style-type: none"> - Reducing Violence against Women - Women and the Economy - Women and the Environment 	<ul style="list-style-type: none"> - Measure the incidence of violence against women - Conduct qualitative and quantitative survey on the status of women regarding employment - Conduct a Knowledge, Attitude, Practice and Behaviour survey
Uplift of Health	<ul style="list-style-type: none"> - Reduce Child Mortality - Improve Maternal Health - Promote Access to Safe Water Supply and Sanitation - Reduce Malaria Mortality Rate - Reduce Tuberculosis Mortality Rate - Combat HIV/AIDS 	<ul style="list-style-type: none"> - The target set in 2011 is achieved - Measure the gap between the target and attained level of performance - Proportion of population with sustainable access to improved safe water with access to improved sanitation - Prevalence and Death rates associated with Malaria - Prevalence and death areas associated with tuberculosis - The number of trainings held, and reviewing of the activities
Culture	<ul style="list-style-type: none"> - Preserve and Safeguard the Myanmar Culture and Traditions - Preserving and Protection of Cultural Heritage - Protection of Cultural Properties 	<ul style="list-style-type: none"> - Review the curricula of Basic Education, the frequencies of activities held - Number of talks, seminars and workshops held - Number of cases breaking archaeological laws - Number of ceremonies handing over of cultural properties found.
Social Development and Tourism	<ul style="list-style-type: none"> - Poverty Alleviation through Tourism 	<ul style="list-style-type: none"> - Number of tourist visiting Myanmar's community-based tourism sector.
Strengthening Development of Border Areas and National Races	<ul style="list-style-type: none"> - Providing more NFPE programmes for Border Area Development 	<ul style="list-style-type: none"> - To active literacy rate up to 99.0% by 2015

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