

Globe International October 2009, Copenhagen

Denmark and renewables – a case story

By Anne Grete Holmsgaard MP

Dear colleges, dear Globe International. Thank you for this opportunity to present some of the experiences we have done in Denmark during the last couple of decades.

The purpose of the next 10 – 15 minutes is to present Denmark as a case story and to share those experiences with you – knowing that conditions are different from country to country.

In some countries like in Denmark and many of the North European countries we have abundant amounts of wind. On land – which you have already experienced - and off-shore – meaning in the North Sea and in the Baltic Sea.

We also have a quit a substantial amount of biomass, geothermal resources in the underground – and – believe it or not some solar resources.

Others have abundant resources of solar-power and hydro power.

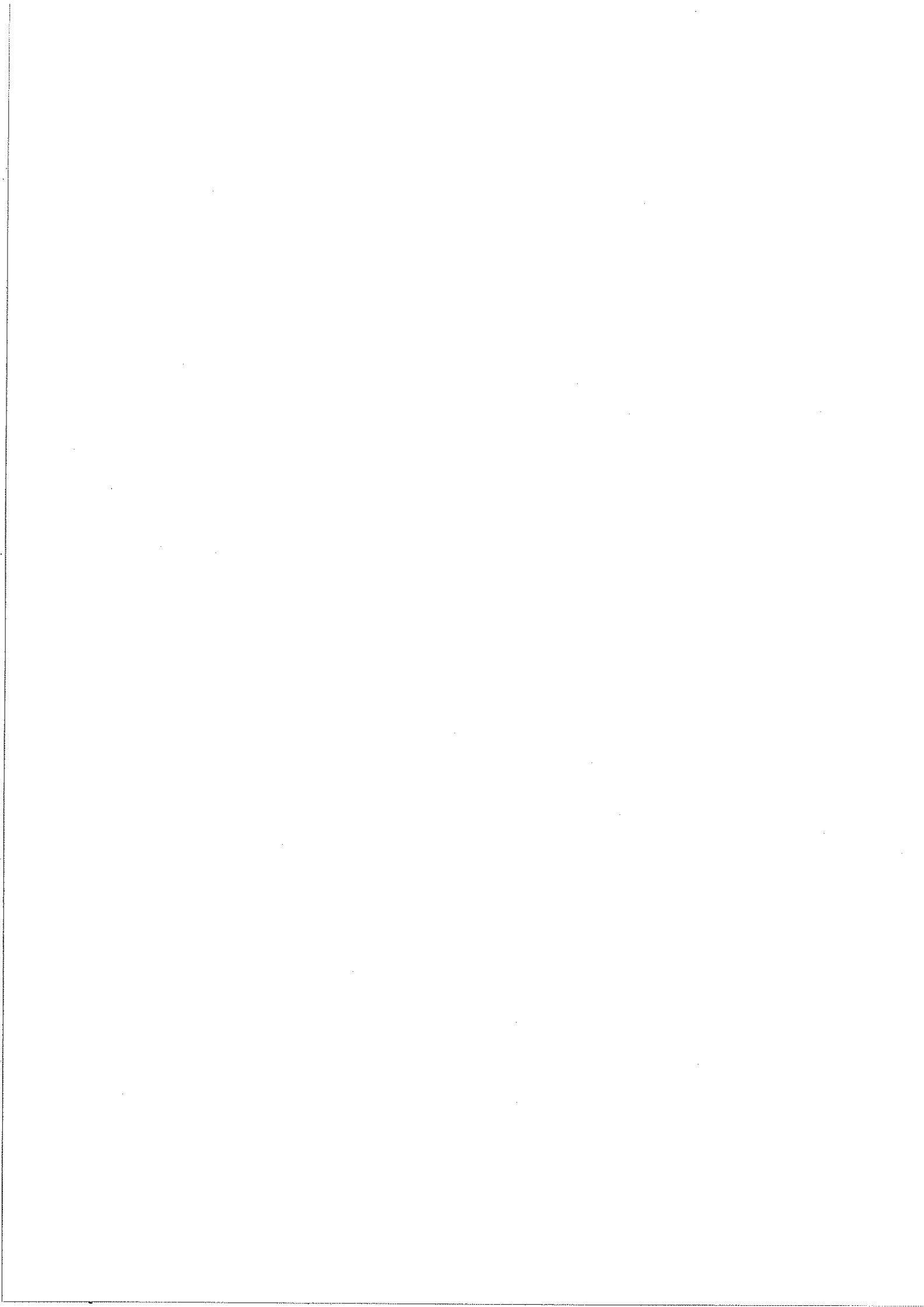
The message is: We all have a mix of renewable resources and the obligation is to analyse and use exactly the resources that are best for the single country and the region.

But let me start with a short overview of the development in Denmark during the last 30 years. (PP 1.)

During the last 30 years we have been able to decouple gross energy consumption and economic growth

The main tools have been (PP 2)

- A strong focus on combined heat & power – meaning less loss in the systems. Today 60% of all households have district heating
- Better efficiency in the plants – the on a world level
- Energy saving in industries and households – better insulation in houses and industrial buildings, better appliances (refrigerators etc., strict standards for new building – and moving into standard for refurbishing of buildings.



(PP 7) Wind counts for app. 20% of electricity production. It is the highest share in any country in the world. This percentage will go up in coming years to 29% by 2012 and it can without problems raise to 50% by 2020. That is solely a matter of the necessary political decisions. Ms. Dorthé Vinter from our public owned grid owner and system operator will tell you more about the preconditions to make this a success.

(PP 8) This shows a picture of renewables in total energy consumption. Most renewable is biomass: Waste burning, straw + wood in combined heat and power + biogas

(PP 9). The key instruments have been

- RE targets – political decisions
- Feed-in tariffs + tenders (off-shore wind)
- Co-ownership – local associations
- Well functioning planning: sites for wind etc.
- A well-functioning grid – public + non-profit
- Highly skilled operation of grid
- Research + test sites

(PP 10)

Let me tell you a little more about how this works:

- **Tender** : Large scale farms + political agreement – price: 10 – 12 US cent/kWh)
- **Feed-in tariffs**: Wind, biomass, solar etc.- different tariffs (varies: Wind 5 US cent/kWh for around 5-7 years, biomass: 3 US cent/kWh – not time limit)
- In both cases: **paid by electricity consumers** (“Public service obligation” – PSO) – this is not a tax or a levy but something else.
- Cable to shore + transmission lines paid by electricity consumers
- **access to grid** to all renewables. All electricity is sold on the market

(PP 11)

There is a high popular acceptance of wind in Denmark – also among environmentalists – partly because there has been a strong co-ownership in local communities.

(PP 12)

Just a picture of off-shore wind farms

(PP 13)

And the same for on-shore wind

(PP 14)

Finally: We consider the energy sector and the transformation of this sector as extremely important to our economy. As the PP shows Export of energy equipment has been growing faster than any other export sector in Denmark.

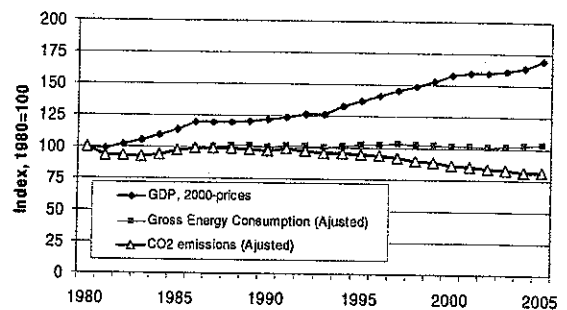
Dear delegates. I hope this little case story can be fruitful for you. We all need to change and to change fast. And we will not manage that unless we share experiences.

Tank you.

Renewable Energy Denmark as a case story

Anne Grete Holmsgaard, MP

Energy Consumption, CO2 Emissions and
Economic Activity in Denmark 1980-2005



Energy efficiency has delivered

- **End-use energy efficiency**
 - savings in buildings (better insulation, standards etc.), in appliances and I industry
- **More efficient supply system**
 - Cogeneration – CHP and district heating
 - More efficient power plants

Next phase: More efficiency

- Decoupling is **not** enough
- The target is an **absolute fall** in energy consumption
- present target: 2% less by 2012 and 4% less in 2020 (compared to 2006)
- BUT, we can go much further – it is “only” a political question. Our target (opposition) is 40 -45% less by 2050

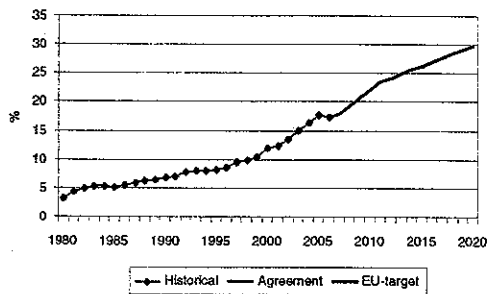
The starting point!

- 1973-74 oil price shock
- Electricity production: 90% oil + 10% coal
- First energy-plan: From oil to coal + nuclear + natural gas (North sea) – and a little RE
- Strong debate on nuclear + “alternative plans”

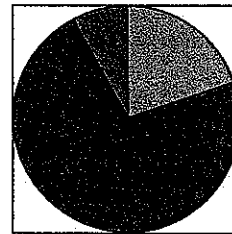
The 1980'es

- **No to nuclear** energy (1985)
- Focus on decoupling economic growth and energy consumption
- strong focus on **combined heat and power** and district heating = less loss of energy
- Growing focus on a **decentralized system** and **renewables** - mainly wind and biomass (straw, wood, waste, maure)

Development of renewable energy in Denmark

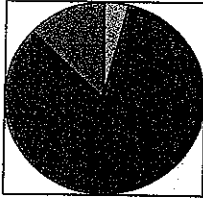


2008: Electricity supply 20% wind growing to 29% by 2012

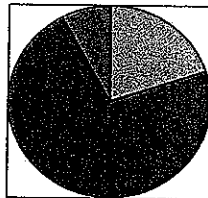


8% biomass growing to ?

Renewable Energy in Denmark



Total E-supply - RE 17%



Total electricity supply - RE 28%

Key Instruments to promote RE in Denmark

- RE targets – political decisions
- **Feed-in tariffs + tenders** (off-shore wind)
- Co-ownership – local associations
- Well functioning planning: sites for wind etc.
- A well-functioning grid – public + non-profit
- Highly skilled operation of grid
- Research + test sites

Tender and feed-in tariffs

- **Tender** : Large scale farms + political agreement – price: 10 – 12 US cent/kWh)
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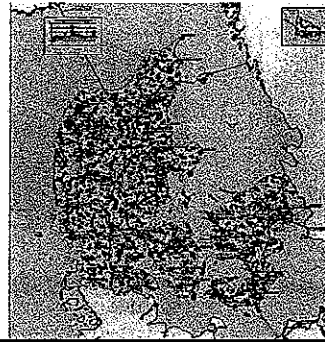
High public acceptance on wind

- Wide spread grass root support
- Bi-partisan political support and leadership
- Ownership - incentives for private investment – including “wind-laug”
- Careful involvement of the public in decision procedures

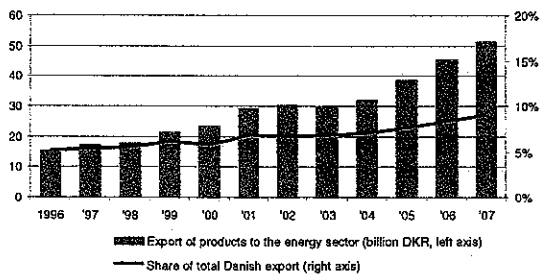
Off-shore wind



Onn-shore wind – 3.200 MW



Commercial benefits of the development



Can a Copenhagen Agreement Reinforce Economic Recovery?

**GLOBE Copenhagen Legislators Forum
Copenhagen, Denmark
October 24, 2009**

**Remarks by Graeme Wheeler
Managing Director, Operations
The World Bank**

CHECK AGAINST DELIVERY

The Twin Challenges of Climate Change and Development

Legislators in the 21st century will be judged by their success in addressing global warming and reducing poverty.

Based on current trends, energy-related CO₂ emissions would more than double by 2050 and put the world on a catastrophic trajectory that could lead to temperatures more than 5°C warmer than pre-industrial times. Concerted global action is urgently needed to limit global warming to around 2°C. An energy revolution is required to reduce global carbon emissions by half in 2050 relative to 1990 levels, and to decarbonize the world economy by the end of the century.

On the development front, the number of people living in extreme poverty – already more than twice the population of Europe - is increasing. None of the 7 millennium development goals are expected to be met and the 1.4 billion extreme poor (those living on under \$1.25 a day ppp adjusted) are increasingly disconnected from global society. Even this number disguises the true nature of poverty – it disguises the infant mortality, the malnutrition, the lack of access to health care and education, and the political and social exclusion. Demographics will dramatically increase our challenge. Almost all of the 3 billion increase in global population projected by 2050 will occur in developing countries – two thirds of it in regions currently experiencing low economic growth.

Climate change and poverty are deeply intertwined. Modelers suggest that developing countries will bear 75% to 80% of the costs of the damage from climate change. Climate change will be felt most acutely in Africa, where 95% of agriculture is rainfall dependent, and in low lying areas like Bangladesh and small island states.

Just as the financial crisis originated in the developed world and contaminated developing countries, so too has the concentration of greenhouse gas. Today's greenhouse gas problems are largely generated by developed countries with energy use per capita on average 5 times that of developing countries. Negotiations to resolve the issues are immensely challenging – particularly because Greenhouse gases come from multiple sources, and involve serious equity and moral considerations, and difficult issues of sequencing and competitiveness.

The Financial Backdrop for the Climate Change Negotiations

The financial backdrop for negotiating a global solution could hardly be more difficult. We move to Copenhagen at a time when massive portfolio adjustments are taking place in household, corporate, and government balance sheets.

Governments are burdened with new roles as guarantors and investors of last resort, and are taking on ownership interests outside their traditional investor habitat and risk tolerance. Public sector debt to GDP ratios in many countries are on an explosive path and policymakers worry whether mitigation policies will weaken their economic recovery. They are also concerned about the domestic fiscal impact of large financial transfers to developing countries for adaptation.

Retaining a balanced perspective is important. New poles of economic growth are emerging and global growth will accelerate as the portfolio adjustments continue, and the global transfer of skill enhancing technology and the catalysts of trade, investment and capital flows assume greater importance.

The Impact of Climate Change Policies on Potential Output Growth

We should be humble in discussing the impact of mitigation and adaptation policies on trend rates of economic growth. There are many uncertainties.

While the globe will become warmer with an additional stock of greenhouse gases, we do not know how much warmer or the specific impact on land use patterns, water scarcity, coastline flooding, and spread of new diseases.

Climate change is the largest externality challenge of our time. Internalizing this externality through pricing and regulation will increase the costs of production. In the short and medium term, this can have distributional impacts and slow the rate of economic growth. However, it is difficult to quantify the overall magnitude of these output effects through time - especially because these policy changes help reduce the longer term social and economic costs of more serious global warming.

It is very clear that preventing global warming in excess of 2°C will require substantial investment to transform the world's energy systems and permit the needed adaptation. Pricing and standards will be needed to motivate the energy efficient investment.

Investment in new technologies is key. The necessary reductions in carbon emissions cannot be achieved with existing technologies without a dramatic slowdown in trend rates of economic growth. A mechanism to price carbon, either through a global carbon tax or a global allocation of tradable greenhouse gas permits, is needed to ensure that new vintages of capital are less carbon intensive.

Replacing existing capital with more energy efficient investment is not costless. It can lead to job losses, but these can be reduced by a well-targeted green fiscal stimulus, with a heavy emphasis on infrastructure.

Infrastructure spending has several positive features. It tends to generate stronger output growth than social transfers or tax cuts, and new investment embodies new technologies and removes bottlenecks to future growth and poverty alleviation. In addition, several studies suggest that investment in green energy generates stronger job creation per dollar invested than investments in fossil fuel energy. This is especially true of investment in solar and thermal energy and biomass.

Provided that the correct pricing signals are in place, the cost of reducing the carbon intensity of the global economy and supporting sound adaptation should be manageable over time for several reasons.

First, by 2050, the global economy is projected to expand significantly due to the spread of new technologies and higher labor force participation – especially in many developing economies. Future generations can expect to be wealthier than current generations.

Second, considerable energy is being wasted in the global economy. We see this with the flaring of gas and the inefficient use of coal and oil.

Third, adjustment to the capital stock need not involve wholesale scrapping. It can be a much smoother process as infrastructure reaches the end of its economic life and is replaced with new vintages embodying more energy efficient technologies. For example, the economic life of new factories and power plants tend to average 15-40 years. Road, rail, and power distribution networks - 40-75 years.

Opportunities to shift from high carbon to low-carbon capital stocks are wide-ranging and unevenly distributed in time. The lifetime CO₂ emissions from coal-fired power plants planned around the world over the next 25 years are expected to equal those of coal-burning activities since the pre-industrial era.

And fourth, some countries will seek to develop dynamic capabilities and competitive advantages as providers of new technologies. Substantially expanded investments in research and development (possibly in the range of \$100 billion to \$700 billion annually) will be needed to develop these technologies.

Where are we in this adjustment?

Some real challenges lie ahead. While \$500 billion or 15% of the \$3 trillion current global fiscal stimulus relates to green infrastructure, this requires pricing and regulatory reforms to be more transformative. And when governments experience severe fiscal pressure, infrastructural maintenance is usually an early casualty, and less capital intensive technologies are adopted. We have seen this many times in Latin America, where countries have favored thermal power plants over hydro because of lower upfront

capital costs – in spite of higher recurrent costs and a requirement for imported fuels. In addition, developing countries will need substantial financial support to build and transform their capital stock - particularly since 80% of their infrastructure is financed publicly or through official development assistance.

What is the World Bank Group doing?

We are stepping up our role and rapidly expanding our lending on energy efficiency and renewable energy. Last year, this grew by 25% and exceeded \$3 billion. This represents around 40% of total energy financing and our goal is to increase this to 50% by 2011.

Nearly \$7 billion has been pledged to the Climate Investment Funds. These funds have stimulated new low carbon or climate resilient work in over 20 countries.

We are also heavily involved in carbon finance. The 10 World Bank- managed carbon funds have, to date, purchased emission reductions from over 200 projects with an estimated carbon asset value of \$2.5 billion.

We have issued green bonds and developed weather derivatives and hurricane insurance related products. We are testing methodologies and tools for greenhouse gas analysis of forestry, energy, and transport projects, and several country studies are underway on low carbon growth.

What do we need from Copenhagen?

A major breakthrough is needed.

High income countries need to commit to ambitious and credible carbon emission targets that can stimulate public and private investment in green infrastructure. Such an agreement would accelerate the expansion of carbon markets.

These commitments, along with an improved Clean Development Mechanism and finance and resources for developing countries to facilitate their adaption and mitigation efforts, would permit the early action that is necessary.

We know the consequences of not embracing the energy revolution that is needed. We cannot afford to let negotiation on climate change stultify like the beleaguered Doha Round. The stakes, which involve the future of the planet, are simply too high.

Speech
by
Takeshi Maeda

I am very grateful to be given an opportunity to make a speech on this GLOBE Copenhagen Legislators Forum. My name is Takeshi Maeda. I am secretary general of GLOBE Japan. This year marks the 20th anniversary of GLOBE. In this memorable year, I would like to make a renewed and concerted effort with other legislators from across the world to fulfill GLOBE's great mission.

Our approach to addressing climate change is critical for a sustainable global community of humanity. It is thus imperative that COP 15 in December here come up with an outcome that will lead to a solution to this problem. In Japan, following the general elections, the new government of the Democratic Party of Japan (DPJ) led by Prime Minister Hatoyama assumed the office on September 16. And shortly thereafter, on September 22, Prime Minister Hatoyama announced at the U.N. Summit on Climate Change in New York that Japan would reduce greenhouse gas (GHG) emissions by 25 percent from the 1990 level by 2020. This was a major decision made by the Japanese government for the next generation. Naturally, our country's effort alone will not be enough. All the countries, especially major emitting countries, have to make their own efforts to reduce emissions. This means we have to make investments on a global level in energy efficiency improvement, clean energy and other measures.

According to an IEA report released on October 6, we need more than 400 billion dollars to achieve the 450 ppm Scenario, say keep 2 degree increase. Among them developing countries alone need 200 billion dollars. This calls for a new financing mechanism for meeting such enormous demand for funds. Such amount will neither be met by official development aid or by emissions trading alone. What is important is the role of private sector funding. That is why Prime Minister Hatoyama stated "the developed countries ... must contribute through ... public and private financing" in his address describing the Hatoyama Initiative at the U.N. Summit.

Designing an efficient financing mechanism requires definite figures that speak for facts. While I believe the importance of the role of private sector funds is shared among GLOBE members, I would like to see GLOBE recognize this point anew and propose ways to implement necessary measures effectively and efficiently. I will now give the floor to Mr. Takashi Hongo, Special Advisor of JBIC, so he will describe financing demand and supply of funds at the global level.

Climate Change and Security: A Convergent Perspective

By

Air Marshal AK Singh (Ret)
Centre for Air Power Studies, India

Reality

Before I start my talk here is a small movie clip to remind us where the human race stands today and what the repercussions of wanton destruction of environment are.

Climate Change and The Military (CCTM)

Climate change is a global challenge which can be resolved by international cooperation. While this statement may sound clichéd but the hard fact is that international cooperation is missing and Nations are trying to deal with this challenge individually. The economic competition between countries has become so paramount that they are turning a blind eye to the looming human security disaster waiting to happen. The adverse impact of climate change in South East Asia and other nations is unfolding a saga of human tragedy which cannot be ignored any further. **The discussions on the impact of climate change on security are still mired in the twilight zone. A few countries are accepting it as inevitable for reasons that serve their purpose while others are against the securitisation of climate lest the stand exposes a weak flank, as the saying goes in the military. What I propose to do is to inform this august audience that there is a convergence of the two perspectives and all that is required is to define security in the current perspective.**

Role of Security Institutions: South East Asia

The militaries of this region are uniquely placed to contribute to the process of formulating a political and a policy response that is adequate to tackle the risks of climate change. Their focused approach towards the job at hand can serve as a model for the leaders, tackling the climate change. However, the military will need to operate outside their traditional policy sphere of guarding national borders and the 'comfort' of a known zone if they are to participate in the climate change debate.

The process of adapting existing military institutions mentally and physically should be accelerated in the context of a world undergoing paradigm shift in security needs due to climate changes. While there is still some time to prepare to respond to the worst security impact of climate change i.e. onset of conflicts, the pressure to be prepared is rising faster than expected. **The role of military to safeguard human security is now being redefined since these challenges are already upon us.** The incremental and abrupt climate changes being faced in all parts of the world pose a unique challenge for the security community – one which urgently calls for redefining their role.

Consequences of Climate Changes

The findings of IPCC in their IVth assessment report of 2007, on the dwindling natural resources of land, water and food are now being observed as conservative since the impacts of scarcities of resources has overtaken the predictions.

The IPCC report unfortunately has ignored certain “scary scenarios” whilst modelling impacts of climate change. A summary of these tipping point which may lead to rapid acceleration of global climate change are:

- **A likelihood of dramatic and extreme rise in sea level due to glacial melt and continual break up of the ice sheets will further add to scarcity of habitats in South East Asia.**
- **There is growing proof that the Greenland ice sheet is melting at an increasing rate and could collapse abruptly.**
- **There are findings that temperatures in Antarctica are rising at a faster pace than all other regions of the planet thus adding to the danger of ice break up.**
- **The Atlantic Gulf Stream which plays a major role in the climate of Western Europe reveals a 30% slowing from 1957 figures to 2004.**
- **The potential effects of thawing of soil, permafrost and seabed deposits will accelerate release of greenhouse gas in the Arctic. When the impact of events outlined above start to unfold; rapid and fierce climate change would signal a faster pace of humans towards an insecure and uninhabitable future.**

Climate Change and Security in South- East Asia

Climate change poses a systemic challenge to security in South East Asia. It requires that cooperative, long-term and preventive approach to security which has long been advocated, but seldom implemented in real decisions. Climate change has added to the

uncertainty and disputes surrounding distribution of dwindling natural resources like water, land and food amongst the vulnerable strata of society. A finding by the Indian Space Research Organisation (ISRO) has observed that the major Himalayan glaciers have shrunk by 21% in the last 40 years. The satellite pictures today show that the famous or rather infamous for being the world's highest battlefield Siachen glacier which is 70 Km long and 5-10 km wide is shrinking rapidly and showing increasing number of blue lakes within its expanse. **One of the world's biggest watersheds is the third pole "The Tibet Plateau"; on which depends more than 25% of the world's population, which feeds more than 10 rivers that flow out of it.** This source is not inexhaustible and with accelerated melting of Himalayan glaciers the water shortages in the long run would be the cause internal and external tensions as millions of lives would be at stake. **Both the food and water scarcity issues in these parts have the potential to cause cascading ripple effects all over the globe.**

The shortfall in the agriculture produce that is bound to be the result would affect not only the respective country but the entire globe.

In addition to the glacial melt the rapidly melting Arctic ice and permafrost, is also a cause for concern. **The increasing levels of sea is driving the anxiety levels of coastal populace and smaller island nations like Maldives are already looking at the prospect of searching for an alternate country to live.** Towards the southern tip of India, the problem of Lakshadweep island loosing land mass is yet another cause for concern. Serious

security repercussions of such occurrences are obvious. For example the reduced seasonal flow of Indus River water is fast becoming a hotspot of concern between India and Pakistan. A gradual loss of land in the Ganga-Brahmaputra Delta due to the rising sea is displacing migrants in large numbers leading to illegal migration- yet another area of concern. The consequences of global warming would thus be felt much after the "Copenhagen Agreement", even if all nations were able to rise above their competitive positions and arrive at an agreement. The existing state of affairs does not bode well for the coming decades. Nations would have to come out of rhetorical posturing if human tragedies such as draughts and famines are to be avoided.

Climate Change: National Security Concern- An Indian Perspective

There are major implications for the Indian security due to climate change. **India's neighbourhood consists of countries like Bangladesh that would be badly affected by the adverse impacts of climate change as they are not in a position to cope with it due to their poor economic resilience.** This would also provide breeding grounds for terrorism and other forms of class struggles all around causing an adverse impact on security of a vast population. The arctic ice melt may open new navigable routes bringing cheers to some but its affect on the coastal populations around the world would be terrible. **The disappearance of inhabitable land due to rise in sea level even at the scale projected by IPCC would spell trouble for India and its neighbours. USA and some Nations in EU would also**

see large scale migration of people from coastal areas to inland or across international borders if the support structure within the state collapses. India may then see an influx of almost 20 million humans pushing their way towards a safe haven. The resentment against these migrants would come to fore with political and armed movements against them resulting in ethnic conflicts. **Food and water are the other life nurturing natural resources which would see pressures on the supply chain due to climate change.** As per the UN World Food Programme (WFP) latest reports around 1 billion people in Africa and South Asia would face hunger this year partly caused due to climate change called the weather related hunger. **At this pace the world seems to be hurtling towards an unsustainable future with the vulnerable population at a great disadvantage.**

Present Position

The incremental and to an extent abrupt climate change events, **pose a serious human security problem at present.** The social impacts would include the consequences of adaptation techniques that countries are forced to adopt for mitigation of climate change. The scarcities of resources at present level, have not as yet assumed serious proportions but they certainly have resulted in adversely impacting upon the quality of life and causing misery to a vast global population. Since economic security happens to be one of the pillars of the human security, any adverse impact of climate change which increases poverty and vulnerabilities of masses is bound to affect the security of nations. The stakes have to be appreciated by the international community while negotiating the agreement at Copenhagen.

Developing Situation

With worsening of climate change, number of sudden atmospheric events like cyclones and storms are increasing. The frequency of floods in South Asia has already doubled in the last three decades leading to a loss of 32 billion dollars in the same period. **The impoverished population would become increasingly defiant and the human security issues outlined above would then degenerate into an internal security problem.** With increasing inter- and intra-state migrations, the class distinctions would become fiercer. Federal government's authority would be seriously tested in maintaining a semblance of order between provinces/states since each would be jostling for the dwindling resources. The political compulsions would force the respective provincial governments into belligerent postures to meet the demands of their own citizens fighting for survival.

Future Scenario

These scenarios also have the potential, **to degenerate into an international conflict though the timelines cannot be predicted with any certainty.** With worsening of water, land and food situation, and its impact upon the vulnerable populations of weak nations, not only affect the neighbouring states but even the far off countries of the West would face the heat of climate change induced large scale migrations from Bangladesh and Maldives etc. The river sharing agreements between nations is already under tremendous stress, in addition wherever the fault lines exist these stresses are further concentrated forcing countries to approach the World Bank seeking intervention on sharing of river waters.

It is agreed by almost all nations that climate change is a human security issue however, the linkage between human security and National Security needs to be appreciated, which then would make the nations realise the lurking danger of climate change impacting upon national security.

Climate Change and the Indian Military

The impact of climate change on India's security would definitely call for the Indian defence forces to incorporate the variables arising out of climate change, in their future military planning. Some of the direct impacts of climate change that the military would have to contend with are listed below:

- **The melting of glaciers and global warming would completely change the methods of logistics support to the forces in Siachin and other higher reaches of India.**
- **The rising sea levels would affect the coastal naval assets in Goa and Andamans, which will have to be suitably relocated.**
- **Increased desertification would see water shortages in more parts in north-west India. This would have to be adequately catered for in Army's training and operational planning.**
- **Due to phase-out of ozone depleting chemicals (Montreal Protocol) used in military hardware; their management would have to be contended with.**
- **Indian military would have to have an enhanced health care programme as the rise in health hazards caused by sudden climate change events would have to be factored.**

- This is especially relevant to the military as they are called to operate in some of the most inhospitable areas in the country and abroad.
- **Due to increase in ambient temperatures, the snow melting at the higher reaches would show a change in the pattern resulting in greater availability of land below the perennial snow line. Its implication on the situation across the line of control in Jammu and Kashmir would need to be studied by the military. These issues are actually being presently faced by the army.**
- **Last but definitely not the least, would be the pressure on military to cope with encroachments on their land due to rising influx of migrants from across the borders. The impact on National Security concerning military action is not about responding to immediate threats but is about preserving strategic options.**

Conclusion

The Hindu philosophy of Karma is very apt in this context **“Do not aspire for results but act and only then there would be a result”**. The relationship between climate change and security is here to stay and it would be myopic on the part of the security establishment to not take cognizance. The political compulsions of public posturing should not deter the establishment towards combating the changing security scenario in their backyard. Failure to recognise the devastating implications of climate change on peace and security could prove to be very costly resulting in the worldwide instability and retarded development not to mention – loss of human life.

The need of the hour is of a collective vision, a vision of a world where we are able to co-exist with nature giving back as much as we take, Jonathan Swift said it best when he said, and **“Vision is the art of seeing things invisible”**. Ladies and Gentlemen it is the collective responsibility of the Parliaments to make this invisible apparent and tangible for the masses to follow.

**GLOBE INTERNATIONAL:
GLOBE COPENHAGEN LEGISLATORS FORUM
Copenhagen, 24-25 October 2009**

**PROF. DR. BOMER PASARIBU
The Commission on Land Use Change and Ecosystems**

**INDONESIA CORAL REEFS:
The Impact of Climate Change and The Future Challenges on
Management and Sustainability**

I. INTRODUCTION

The Republic of Indonesia is the biggest archipelago country in the world consisting of 17,504 islands and a coastal line of 81,000 km with marine waters extending up to 5.8 million km², consisting of 3.1 million km² of territorial and archipelago seas and 2.7 million km² of exclusive economic zone (EEZ), and high biodiversity species.

The extensive coastlines of Indonesia is mostly protected by coral reefs and support a biodiversity of reef types, that are fringing reefs, barrier reefs, atolls, apron reefs and patch reefs. The three most important reef building coral genera in Indonesia as one of the major coral reefs countries are *Porites*, *Acropora* and *Montipora*.

The vast biodiversity of Indonesian coral reefs and the increasing threats as the impact of climate change to the ecosystem and marine resources align with the fact that the demand of those resources are considerably increasing from time to time, therefore there is a strong need to manage and utilize those resources in sustainable way and to work together with other countries, especially for regions that ecologically and biologically connected.

II. THE ROLE AND THE IMPORTANCE OF CORAL REEFS

Coral reef provides important and valuable living resources that can be used as food and medicinal raw materials. Coral reef is also very much appreciated for its beauty and colourful creatures and their living behaviour which attract tourists from all over the world. Its attractive beauty has been exploited as a source of income for the regions as well as for the country in general through tourism industry. Nowadays, marine tourism is undergoing vast development and the presence of intact coral reef with high species diversity and their beauty will be a highly valued tourist attraction.

Coral reef is the "home" of thousands of marine animals and plants, some of which are of high economic values. Various animals live, feed and breed in this ecosystem. Million of Indonesian people are dependent on coral reef for their livelihood. Sustainable harvest of fish, clams and crabs from this ecosystem all over the world may attain 9 million tons or equivalent to approximately 12% of the total world fishery production. Coral reef fishery plays very important role to the local communities since they are still using traditional gears to collect the fish and other marine products.

Apart from its economic value, coral reef is a unique natural laboratory in which various researches can be done leading to new findings that may be of great value to mankind. For example, some of coral associated sponges species are believed to produce bioactive substance that has a high potency to be further developed for cancer treatment. Similarly, the carbonate skeleton of coral colony has been used in osteotherapy. The fringing reefs physically protect the coastline from adverse effects of waves and currents.

III. CORAL REEF CONDITIONS

The observations in 908 stations by *Pusat Pengembangan Oceanology (P2O) LIPI* in 2007 indicate that coral reef in excellent condition consist of 5,51% of the coral reef areas, those that in good condition consist of 25,11 %, those in bad condition comprise the 37,33%, and 32,05% are in worse condition (Nontji, 2004). The impact of climate change and the increasing population in Indonesia and economic development are causing increased pressure on marine resources. Failure to adopt environmentally sound development criteria resulted in excessive and unsustainable use of marine resources (over exploitation) include coral reefs.

Table 1. Coral Reef Conditions in Indonesia in 2007 based on 77 regions and 908 sites throughout Indonesia

| Location | Number of Regions | Number of Sites | Condition by % Life Coral Cover) | | | |
|----------------|-------------------|-----------------|----------------------------------|--------------|--------------|--------------|
| | | | Excellent | Good | Fair | Poor |
| West | 35 | 362 | 5,52 | 27,07 | 33,98 | 33,43 |
| Central | 27 | 274 | 5,11 | 30,29 | 44,89 | 19,71 |
| East | 15 | 272 | 5,88 | 17,28 | 34,19 | 42,65 |
| Average | 77 | 908 | 5,51 | 25,11 | 37,33 | 32,05 |

Source: Suharsono, 2007

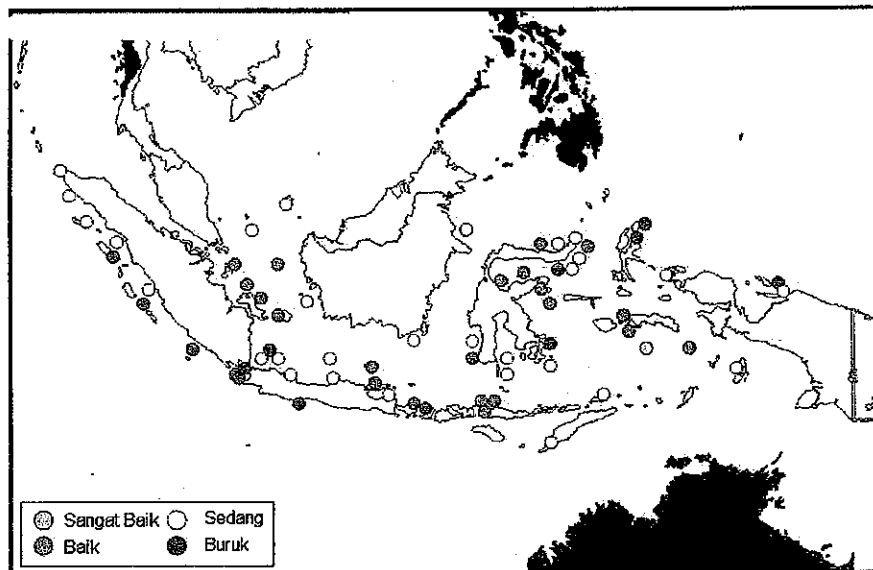


Figure 1. Coral Reefs Condition across Indonesia (Blue = Excellent, Green = Good, Yellow = Fair, and Red = Poor) Source: Suharsono, 2007

Based on time series data, coral reefs in western part of Indonesia tends to be improved while in the eastern part of Indonesia are in vice versa. Formerly, coral destructions occurred near human residence, nowadays they move to further out by several reasons, such as: resources are already diminishing and they are looking for farther fishing grounds where control is weaker

IV. THREATS TO CORAL REEFS

Coral reefs communities have a remarkable natural resilience with respect to natural perturbations such as tropical storms and cyclones. On the other hand, coral reefs are very sensitive to environmental impacts associated with anthropogenic activities and produce secondary effects which are difficult to predict. Major sources of coral reef degradation in Indonesia can be grouped into natural factors and human impacts.

The major forms of human impacts upon coral reefs include sedimentation, coral mining, discharge of industrial wastes, sewage discharge, destructive fishing practices, collection of corals and fishes, tourism and recreational activities, and oil pollution.

A. Management Needs

At the mean time, there are several program running in Indonesia that dealing with coral reef rehabilitation and management, such as Coral Reef Rehabilitation and Management Program Phase II called COREMAP II, and other programs that implemented by related institutions and NGOs. Mostly, they introduce conservation approach along with community empowerment program in order to conserve the environment as well as empower community to have better welfare that will lessen the pressure to coral reefs.

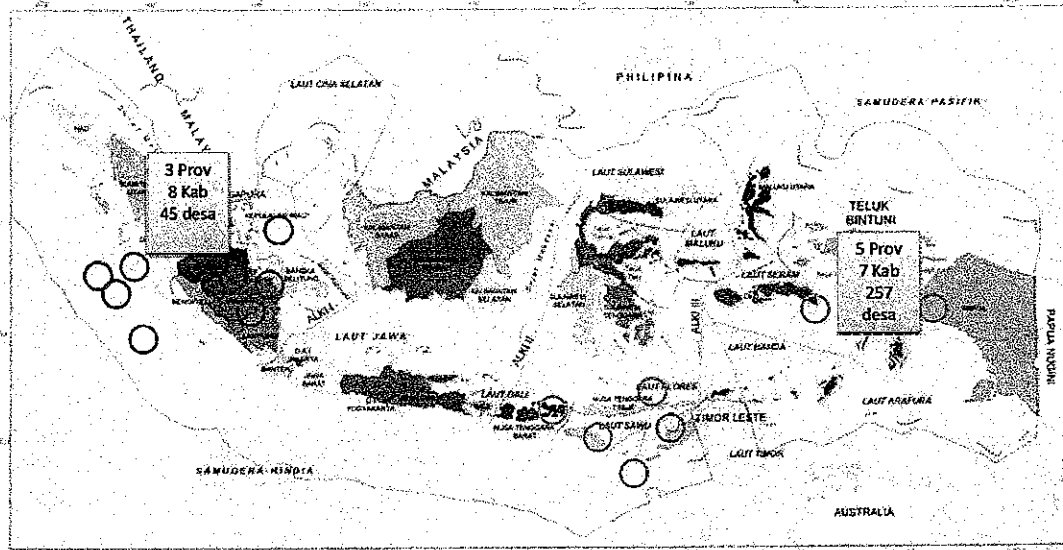
B. Coral Reef Rehabilitation and Management Program (COREMAP)

Coral Reef Rehabilitation and Management Program Phase II is a continuation process of COREMAP Phase I. The COREMAP itself is designed to have 3 phases with five years duration each. During phase I the executing agency was LIPI and in phase II is Directorate General of Marine, Coasts, and Small Islands, Ministry of Marine Affairs and Fisheries.

COREMAP II overall goals are: a). healthy coral reef ecosystems and b). prosperous coastal communities. COREMAP II will contribute to these overall goals by a). enhancing national and local capacity to manage the country's coral reef resources and b). rehabilitating and effectively managing priority coral reef ecosystems, thereby helping raise income levels and improving living standards among poor coastal communities. By the end of the project, economical, effective, and replicable approaches and systems for achieving these twin objectives would have been demonstrated to provincial and district governments, local communities, and reef resources user through pilot activities in a wide range of high-priority coral reef regions in the country.

COREMAP II has two major components, which are a). Institutional Strengthening and Project Management, and b). Community Based Resource Management and

Development. The project is being implemented in fifteen districts in eight provinces from West to the East of Indonesia.



Western Part of Indonesia

- | | |
|-----------------|-------------------------|
| 1. Prov. Sumut | 7. Kab. Mentawai |
| 2. Prov. Sumbar | 8. Kota Batam |
| 3. Prov. Kepri | 9. Kab. Natuna |
| 4. Kab. Tapeng | 10. Kab. Kepri (Bintan) |
| 5. Kab. Nias | 11. Kab. Nias Selatan |
| 6. Kab. Lingga | |

Eastern Part of Indonesia

- | | |
|----------------------|---------------------|
| 1. Prov. Sulsel | 7. Kab. Selayar |
| 2. Prov. Sultra | 8. Kab. Buton |
| 3. Prov. NTT | 9. Kab. Wakatobi |
| 4. Prov. Papua | 10. Kab. Sikka |
| 5. Prov. Papua Barat | 11. Kab. Biak |
| 6. Kab. Pangkep | 12. Kab. Raja Ampat |

Figure 2. COREMAP II Location in Indonesia

V. CORAL TRIANGLE INITIATIVE (CTI) OF THE INDO-PACIFIC REGION

The leaders of 6 countries: Indonesia, the Philippines, Malaysia, Papua New Guinea, Timor Leste and Solomon Island, have made CTI declaration on coral reefs, fisheries and food security and adopt the CTI regional plan and action on 15 May 2009 in Manado, Indonesia.

An exceptionally high coral and fish diversity as well as the abundance of marine resources bestowed upon Indonesia. People of Indonesia depended to fish and other marine resources for their livelihood and main food source. Other services given by marine resource such as coral reef are increasingly understood as safeguards to the society, economically and culturally. As true with elsewhere in the world, Indonesia's marine resource is under a serious threat triggered by incentive in term of short economic gain such as overfishing and destruction to the resources, such as cyanide and blast fishing. Global climate change and physical development have added complications to the condition of coastal and marine resources.

President of Republic of Indonesia, Susilo Bambang Yudhoyono understood that to overcome tremendous challenge, Indonesia could not work alone. To resolve crisis of this magnitude will require Indonesia and other five Coral Triangle Countries to work together in approach that transformational and collaborative in nature. The CTI has become the common ground in the which governments and partners are working together to ensure regional level protection of marine resources. The six

governments are finalizing a 10-year CTI Plan of Action that reflects their common priorities and commitments as well as inputs from partners.

The implementation of CTI in Indonesia will be directed towards the accomplishment of the five goals agreed upon in the first Senior Official Meeting in Bali, December 2007. Such goals and targets developed are then tied to the medium and long term government strategies related to coral reefs, fisheries, and food securities. Such implementation plan is laid out in the National Plan of Action (NPOA), which will guide and streamline Indonesia's effort on the ground to achieve conservation of coral reefs for the sustainability of fisheries and food security.

The National Plan of Action consists of two major sections; the first covers the overarching commitments specific to Indonesia's position and conditions, and the second lays out specific commitments related to priority actions aims to achieve targets agreed in the Regional Program of Action (RPOA).

VI. PROMOTION OF MARINE PROTECTED AREAS

Based on potential of coral reef resources with its ecosystem that need preservation and management for community prosperity through approach of a large multiple use marine protected area formation, then COREMAP II implements development of community based MPA synergy/coordination among marine, land and coastal area, with details as follows:

- (a) The purpose of Marine Protected Area community based management in Indonesia are: (i) Protection of marine biodiversity, (ii) A framework for managing a broad range of human activities and value, (iii) Reference sites for monitoring human impacts on ecosystem, (iv) Opportunity for research, (v) Opportunity for ecotourism, recreational and educational activities, (vi) Protection on cultural sites and aesthetic values, and (vii) Benefits for fisheries management.
- (b) The MPAs were selected according to four principles : (a) Representation : include examples of all biological communities and habitats, (b) Viability : areas must be large enough with broad distribution to maintain viable populations of all species in the eco-region, (c) Ecological and evolutionary processes : cross-boundary controls on activities occurring outside MPAs should be strict enough to allow the continuation of the ecological and evolutionary processes that shaped the eco-region, (d) Resilience : MPAs should contain areas that are sources of recruits for the other parts of the eco-region that have a high survival or recovery rate. There is participatory monitoring by community members, student volunteers and government officials include counting and taking samples measurement of reef growth.
- (c) One of main components of COREMAP II is Resources Management and Community Based Community Development that consists of components: (a) Community Empower, (b) Community based resources management, (c) Development of basic infrastructures and social facilities, and (d) Development of Livelihood Income Generation. Based on the components, then MPA in Indonesia is developed based on community based management, that its management and utilization through local community involvement united in *Lembaga Pengelolaan Sumberdaya Terumbu Karang* (LPSTK) and inside it, there are community groups (Pokmas) consists of Livelihood Income Generation development groups,

seed producer groups, fish management groups, marketing groups and monitor groups (Pokwasmas).

- (d) Community based Marine Protection Area (MPA) is marine coastal area consists of Coral Reefs, Mangrove Forests, Sea Weeds and other habitats individually or collectively chosen and stated to be permanently closed from fishery activities and marine biota extraction and its management is carried out by the Government, community and other parties together in its management planning, monitoring and evaluating.
- (e) Community based MPA is formed based on existing ecosystem, especially coral reef related to other coastal ecosystems. Its existence stated through Village Regulations for autonomic districts, especially for Batam MPA determination was done by Batam Mayor because Batam small-district (*kelurahan*) is not autonom. Development of community based MPA will protect and improve coral reef and marine resources in area having important role ecologically, and expected to be a tool of effective fishery management because of fisheries regulations, spawning and larva growing area protection, juvenile maintenance, area protection from over-fishing and sustainable fish stock assurance.
- (f) Development and management of Community based MPA is carried out together among community, local government and stakeholders in villages and working together with NGO and private parties. Responsibility in determination of location and MPA management objectives are determined by community, while technical support, funding and agreement towards regulations (*Perdes, Perbup, Renstra*) are stated by the Government for agreement with community.
- (g) To assure that MPA can be functioned well, Nucleus Zone in MPA is formed; it is a permanent exploitation prohibition zone. Inside this zone, exploitation activities of fish and other marine biota such as coral, sea slug, shells, and other living organism catch are prohibited. Inside this zone, there is healthy coral reefs ecosystem, because they are not disturbed by human activities, that coral biota including coral fish have chances to grow in good condition. In this zone it is prohibited to catch fish using forbidden tools, anchor the vessels, using sticks to push vessels. But undestructive activities such as swimming, snorkelling, and diving for research and recreation activities are not prohibited.
- (h) Measurements of MPA in Indonesia are determined by local communities agreement with its requirement principles as manual that about 10-30% from coral reef area in the village location, if its area is too small MPA will not ecologically functioned, while if its area is too wide, then community control of MPA is less and it will be conflicts among fisher communities. Therefore MPA development in COREMAP II in Indonesia is carried out by: Coverage of coral is about 30-50 %; Density of coral fish and other biota are quite high; Represent the habitat, average and slope of coral reef, mangrove, sea weed area and other important habitats; Cover 10-20 % from all coral reef habitat; Avoided from sedimentation, pollution and stream flow effect; Not fish catchment area for fishers; Not boat docking area; and Community access for surveillance is effortless

Village scaled small MPAs are also functioned as receivers and places/sources for coral fish to spawn and larva maintenance. To increase effectiveness of ecological

function as protection area, village MPAs are connected to be a network, known as Marine Management Area (MMA) in district/city level. Through that way, a community based MPA system will be very effective to support each other in supporting wider conservation area (MMA) achievement in assistance area of COREMAP II.

VII. MARINE PROTECTED AREA (MPA) AND COREMAP II ROLES

A Marine Protected Area (MPA) is a marine area, including coastal areas and small islands, where plants, animals, and ecosystems, as well as historical and cultural heritage sites are protected by law or by any other effective means (*Komisi Nasional Konservasi Laut, Komnaskolaut, 2005*). Marine Protection Areas (MPAs) are essential tool for the protection of marine biodiversity and for the management of fisheries and other uses. Individual MPAs are usually not sufficient to protect biodiversity and manage use in a large area, and therefore large areas require development of a network of MPAs.

The Indonesian Ministry of Marine Affairs and Fisheries (*Departemen Kelautan dan Perikanan / DKP*) targets to establish MPAs with a combined area of 10 million hectares by 2010. In connection with target, the Coral Reef Rehabilitation and Management Program (COREMAP) support the development of MPAs in Indonesia by, among others. The preparation of the "Grand Strategy for a Network of MPAs" will be developed into the "National Strategy for MPAs and MPA Network". Furthermore, the National Strategy will form an umbrella for policies and strategies of central and regional governments that are aligned with global developments in this sector.

In effort to keep and protect sustainability of coral reef resources and its ecosystem, then COREMAP II have implement development of Rehabilitation and Management of Coral Reef program through approach of Marine Protected Area management that involves local community/family around the area or by collaborative managers both local community and Local Government representatives or a village-managed no-take area that are District KKLD (District Marine Conservation Area) and DPL (Village Managed No Take Area)

KKLD which is protected area managed by a government agency at the national, provincial, or district level, formalized under UU31/2004 on fisheries, 27/2007 on management of coastal 3 areas and small islands, and/or UU32/2004 on local government. Regulations pertaining to KKP types and zoning are currently in development. COREMAP II focuses on development of KKPs managed by district government agencies. Kawasan Konservasi Laut Daerah (KKLD) is synonym for a KKP managed by the District or the Provincial Government.

DPL is a village-managed no-take area that is formalized through a PERDES (Peraturan Desa). DPLs are generally small (10-100 ha), and therefore they provide fishery benefits only for smaller fish species (e.g. rabbit sh., small snappers and emperors) and sessile organisms (e.g. clams, trochus). Furthermore, these benefits accrue to directly surrounding areas only (i.e., fishery benefits will be minimal a couple of kilometers outside the DPL). Besides providing limited fishery benefits, DPLs serve an important awareness role. Some DPLs are surrounded by a Zona

Penyangga (buffer zone). Fishing is allowed in the buffer zone, so the buffer zone does not count to the 10% goal.

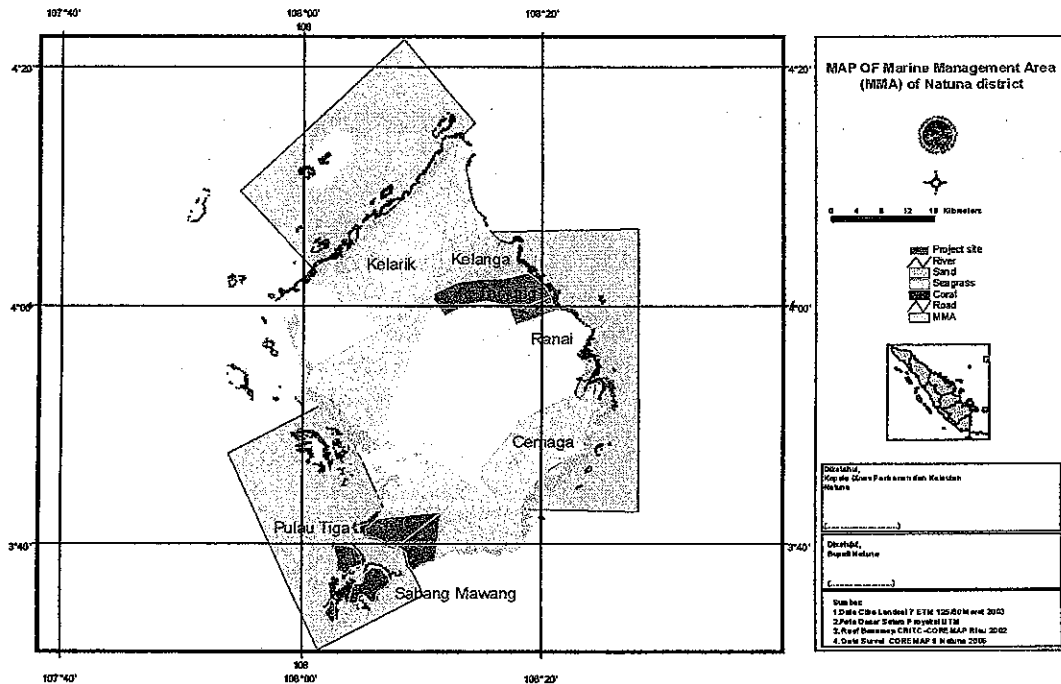


Figure 3. Development of KKLD in Natuna District that facilitated by COREMAP II

One of KKLD in COREMAP II location is Natuna that already legalized by district law on Coral Reef Management (Peraturan Daerah - Perda). The KKLD is managed by the local government and implemented by

VIII. CONCLUSION

The coral reef condition in Indonesia will be protected and rehabilitated by improving the management effectiveness of the existing marine conservation areas and by facilitating the development of new marine conservation areas.

Achieving Coral Reef Management that delivers direct benefit to sustainable fisheries is not only about hectares, efficient zoning plans, and political will. It is also about local availability of human resources for MPA management in decentralization era and a balancing effort between conservation and improvement of community welfares.

COREMAP II as one of the biggest Coral Reef Rehabilitation and Management Project in the world is a good lesson learned for the future implementation of national and regional program of Coral Triangle Initiative (CTI) in Indo-Pacific region consists of 6 countries, Indonesia, The Philipines, Malaysia, Papua New Guinea, Timor Leste and Solomon Islands.

24/10/2009

Considering the importance and the serious impact of the climate change on coral reefs and the social economic implication to the communities, therefore the extended cooperation is needed at global level with the International Commission of Land Use Change and Ecosystem role and initiative.

APPENDIX

**CORAL TRIANGLE INITIATIVE LEADERS' DECLARATION
ON CORAL REEFS, FISHERIES AND FOOD SECURITY**

Manado, Indonesia, 15 May 2009

We, the Leaders of Indonesia, the Philippines, Timor Leste, Papua New Guinea, Solomon Islands, and Malaysia:

ACKNOWLEDGING the vast marine, coastal and small island ecosystems and the unique biodiversity of the Coral Triangle region of the Indo Pacific, which provide invaluable livelihood and food security benefits for our people;

RECOGNIZING the urgent need to address the poverty afflicting our people, particularly our coastal communities, and to meet relevant internationally agreed development goals, including the achievement of the Millennium Development Goals;

EXPRESSING concern over the increasing level of degradation of marine, coastal, and small island ecosystems within the Coral Triangle region;

REAFFIRMING our common understanding to establish a cooperative arrangement to sustainably manage the marine, coastal, and small island ecosystems in the Coral Triangle region and to ensure that these efforts contribute effectively to strengthening food security, increasing resiliency, and adaptation to climate change;

REAFFIRMING ALSO our commitments to promote the sustainable management of our marine and coastal resources, and acknowledging the need for further action;

RESOLVING to take up the challenges of safeguarding the Coral Triangle's vast marine and coastal resources for present and future generations of our people;

DO HEREBY DECLARE:

1. **TO OFFICIALLY LAUNCH** the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF) to address threats to the marine, coastal, and small island ecosystems within the Coral Triangle region, through accelerated and collaborative action, taking into consideration multi-stakeholder participation in all of our six countries;

2. **TO AGREE** that the Coral Triangle Initiative primarily focuses on areas of cooperation in relation to coral reefs, fisheries, food security, and adaptation to climate change;
3. **TO AFFIRM** the Joint Statement of the first Ministerial Meeting of CTI-CFF, held in Port Moresby, Papua New Guinea on 10 March 2009;
4. **TO ADOPT** the CTI Regional Plan of Action, a living and non-legally binding document to conserve and sustainably manage coastal and marine resources within the Coral Triangle region, that takes into consideration laws and policies of each country, as endorsed by the first CTI Ministers' Meeting in Port Moresby;
5. **TO RECOGNIZE** that the implementation of the CTI-CFF is a voluntary cooperation and without prejudice to the sovereignty, territorial integrity, sovereign rights of the six countries respectively over their marine resources, and the position of each state on the on-going and future negotiation on delimitation of maritime boundaries between the countries;
6. **TO EMPHASIZE** that cooperation of CTI-CFF shall be subject to the laws; regulations; national policies and priorities of the respective countries; and the application of relevant sustainable development principles to transboundary management, conservation and development within the Coral Triangle region; as well as taking into consideration the relevant multilateral, regional and bilateral environmental agreements;
7. **TO TASK** our relevant Ministers to formulate the implementation modalities of CTI-CFF with a view to enhancing the cooperation;
8. **TO ESTABLISH** a secretariat for CTI-CFF to service the ongoing CTI-CFF implementation process;
9. **TO CALL** for the mobilization and effective allocation of sustainable financial resources needed to implement the CTI Regional and National Plans of Action;
10. **TO EXPRESS** our appreciation to CTI-CFF Partners for their continuing support towards the successful implementation of CTI-CFF programs in the region, and welcome participation by new partners;

11. **TO CONVENE** the next CTI Summit when deemed necessary, on a date mutually agreed by the CTI countries, to help ensure that a high level of political commitment continues to be dedicated in furthering the attainment of the goals of CTI-CFF.

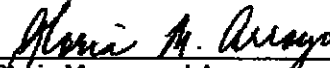
Signed on 15 May 2009 In Manado, Indonesia by:

Government of the
Republic of Indonesia



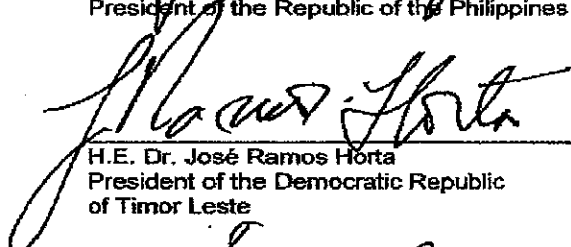
H.E. Dr. H. Susilo Bambang Yudhoyono
President of the Republic of Indonesia

Government of the
Republic of the Philippines



H.E. Gloria Macapagal-Arroyo
President of the Republic of the Philippines

Democratic Republic
of Timor Leste



H.E. Dr. José Ramos Horta
President of the Democratic Republic
of Timor Leste

Government of
Papua New Guinea



Rt. Hon. Grand Chief Sir Michael Somare
Prime Minister of Papua New Guinea

Government of
Solomon Islands



Hon. Dr. Derek Sikua
Prime Minister of Solomon Islands

Government of Malaysia



H.E. Dato' Sri Mohd Najib Tun Abdul Razak
Prime Minister of Malaysia