



Photo by Janaka Withanage

floods in the southern transport development project area- 2007

climate impacts of the adb's business: how the asian development bank finances climate change

august 2009



**Friends of
the Earth
Asia Pacific**



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climate impacts of the adb's business:
how the asian development bank finances climate change

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Photo by Hemantha Withanage

"Filling of wetlands along the STDP site creates flooding which has become a severe threat with increased rainfall due to climate change"

executive summary and conclusion

Climate change is a human made threat to the existence of all that is a result of the over consumption of fossil fuels by the industrialised nations who emit majority of the world's greenhouse gases. Most countries in the Asia Pacific region are not responsible for these anthropogenic emissions. Yet, over 200 million people in the Asia- Pacific are predicted to be so severely affected by climate change that they will be forced to take the most extreme form of adaptation and become climate refugees by the end of the century. Without addressing climate impacts of the environmentally and socially destructive mal-development programs promoted by international financial institutions, including the Asian Development Bank (ADB), these institutions are continuously adding to climate debt creating climate injustices and vulnerability in the poor communities in the Asia Pacific.

The ADB is a major financier in the Asia Pacific region and throughout the case studies in this publication, Friends of the Earth demonstrates that its

projects are contributing to climate change and exacerbating climate vulnerability. Given examples in this publication from projects funded by the ADB in Indonesia, Bangladesh and Sri Lanka have contributed directly and indirectly to the climate change. Destruction of mangroves, forests and woodlands, increase of flooding, disturbing the wetland soil, burning of coal are some activities directly contributing to climate change.

This publication begins to analyze ADB's climate impacts in general through the selected projects in the above countries. These projects have been approved since the late 1990's, after the United Nations Framework Convention on Climate Change (UNFCCC), which commits ratifying nations to global efforts to reduce emissions and prevent 'dangerous' climate change. This global climate change commitment has had no demonstrable impact on the project assessment or general financing practices of the ADB as yet, there are no climate impact assessments included in the development decisions.

The climate impacts of the current development projects will decide the future of development and its benefits to the people. Lack of effective climate impact assessment that sufficiently take into account the unique geographic, geomorphic, hydrologic, ecosystem, social and economic aspects of each project to determine its viability and climate proofing, puts the project and the beneficiaries at risk. Climate impacts vary from project to project. Most importantly, recognition that intact, undisturbed natural ecosystems and continuous cohabitation of traditional and Indigenous Peoples to customary lands are likely to be a dominating factor in maintaining climate resilience is a crucial missing factor of current ADB financing practices.

The Asian Development Bank has developed a number of initiatives that attempt to mitigate climate impacts. However, these initiatives are still significantly overshadowed by the continuous support of fossil fuel projects, namely coal power plants, and aquaculture, oil palm or forest plantation projects which destroy natural forests. Both combustion of fossil fuels and deforestation are leading global sources of greenhouse gas emissions.

The ADB funded projects, analyzed in this publication, have increased the greenhouse gas emissions and increased climate vulnerability of people and the environment.

ADB recently established a suite of climate investment funds, indicating that the institution is aware of climate change. However, they have plenty of

Demonstration by ASEED, Japan during the 40th ADB Annual Governors' Meeting held in Kyoto in May 2007. All major ADB donors were required to reduce their GHG emissions.



Photo by Yuko Yanase, ASEED, Japan

funds (without adequate donations) to cater to the climate related requests. As with most ADB funding, most climate projects are based in India and China.

This publication indicates that in addition to a history of detrimental environmental and social practices, the ADB uses public funds from taxpayers of donor countries for creating this climate havoc for the people and the planet [without borders]. It is a “boomerang” for the taxpayers.

Therefore, we demand the ADB to address the issues raised in this publication through the following actions:

1. ADB must recognize its historical climate debt and commence ‘repaying’ this debt through the rehabilitation of degraded project sites, compensation for affected communities and making provision for the needs of future generations.
2. ADB must stop pushing for neo-liberal policies fostering export dependent economic ‘development’ that negatively affect local communities and create climate disasters.
3. Climate change solutions must be based on a commitment to global equity and genuine resource and technology sharing, to aid and reconstruction, and to transforming the export-focused economic development paradigm to one of genuinely sustainable, just and rights-based societies.
4. Immediately stop supporting fossil fuel projects, particularly construction of coal power stations and coal mines.

Coastal erosion is a major problem in Sri Lanka. Sea level rise due to climate change will be added to this problem. Sixty percent of the people who live in the coastal regions will have to adapt to this danger.

5. Take full responsibility for the impacts of its lending, including cleaning up the legacy its current and past projects have created and ensuring that no future projects contribute to the climate change.

6. Prioritise support for developing member countries and affected communities to reverse their carbon emissions.

7. ADB should conduct stringent climate impact assessments for all its lending to ensure that all projects do not escalate the climate debt or exacerbate climate vulnerability of the natural environment and the local communities.

8. ADB should democratise its project approval process, and ensure the free prior informed consent of local communities and Indigenous Peoples prior to approving and commencing any projects.

9. The safeguard policies under review should include climate safeguards.

10. Ensure that all future projects are spread equitably throughout the region and specially support Small Island Developing States to adapt to the climate impacts which are unavoidable due to historic and current GHG emissions.

11. Adopt a development strategy through a consultative mechanism with international civil society and affected people in all regions of operation to reduce climate impacts of the ADB finances.

12. Adopt a ‘right to redress’ mechanism to enable communities and Indigenous Peoples to bring complaints to or challenge decisions of the executive board of the ADB based on environmental or social grounds.

Friends of the Earth Asia Pacific offers this publication as a means to open a debate on the climate impacts of the ADB projects and the sustainability of ADB business.



Photo by Hemantha Withanage

It's time for justice:

Climate Justice and Climate Debt in the Asia Pacific region

Cam Walker, Friends of Earth Australia and

Stephanie Long, Friends of the Earth International

Data on vulnerability in Asia Pacific region generously shared by Rosario Bella Guzman from IBON.

Climate change is one of the biggest and most important social justice issues to have arisen in recent times. Industrialized nations in the Global North have grossly over-consumed fossil fuels during the last 250 years, producing most of the climate-threatening greenhouse gases emitted to date. In these countries, affluence and privilege are taken for granted; its citizens seldom stop to think about the price. Yet this price is being paid for with a changing climate, and the consequences are a burden shared by all nations.

People living in the Global South will bear the greatest burden: many of them are already having to live with the escalating impacts of climate change. Even though they are the least responsible for greenhouse gas emissions, they are the most likely to suffer the consequences of those emissions, in the form of homelessness, hunger, loss of livelihood, sickness and the loss of their land and cultures.

Communities are particularly vulnerable to the impacts of climate change due to their high reliance on climate-sensitive natural resources. Furthermore, many years of resource exploitation, to feed the consumption demands of the Global North, have degraded Southern countries' economies and environment.

This is especially the case in the Asia Pacific region, where many countries are extremely vulnerable to climate change because of geographic, social and economic factors. Small island nations and communities across Asia and the Pacific have been among the first to start paying dearly for the

The terms 'Global South' or 'South' and 'Global North' or 'North' are used to distinguish generally between impoverished and enriched nations of the world, without implying that 'developed' nations are more civilized or have a state of well-being that everyone else should aspire to.

Demonstration by FOE International during the Global Day of Action In Bali, Indonesia 2007

Global North's way of life, as sea level rises and because of increasingly extreme weather. The injustice of these impacts is thrown into stark relief by the proximity of both Northern and Southern countries within the region.

Countries in tropical Asia have been routinely affected by climate extremes, particularly floods, droughts and cyclones. Critically, the number of these disasters has been increasing steadily over the past 50 years, as has the number of individuals impacted: according to data released in 2005 by the United Nations Development Programme, the number of major disasters has increased fourfold during the past four decades. Asia has had more than its fair share of catastrophe: in the last decade of the 20th century, it was the scene of more than 43 per cent of all natural disasters, and accounted for almost 70 per cent of all lives lost as a result of natural disasters.

Changes in the environment are most sharply felt by people who depend directly on local resources for their livelihoods



and survival. In the Asia Pacific region, this includes between 60 and 80 per cent of the population, who are engaged in small-scale agriculture. Coastal populations and forest dwellers also make up a significant percentage of the population. The United Nations Food and Agriculture Organization estimates that over 90 per cent of the 15 million people working in coastal waters around the world are small-scale fishers. Tens of millions more fish in inland rivers, lakes, ponds and even rice paddies. The World Bank estimates that 90 per cent of the world's 1.1 billion poor derive some of their income from forests, while over 600 million keep livestock, a critical 'cash' asset for many.

The Asia Pacific region's particular vulnerability to climate change is also exacerbated by its weak economy, which is characterized by stagnant growth and severely exploited, degraded and depleted natural resources and capital, as a result of long-term colonization and globalization.

Although the Asia Pacific region is home to approximately 60 per cent of the world's population, and Asia alone accounts for a quarter of the world's GDP and has a labour force of 1.1 billion, the region's economy has been distorted by aggressive liberalization and the shift to a market economy, for the benefit of foreign investors and transnational corporations.

The region has high unemployment rates, available jobs are largely of low quality, mostly unpaid labour on family farms, and forced and child labour are still seen. The bulk of the labour force is in rural areas and depends heavily on agriculture and agriculture-related livelihoods. The majority of the rural population (and even the urban population) continue to be landless and disenfranchised, and there is high rural-to-urban and cross-border migration as a result. For many, there is no concept of living wages, the incidence of poverty remains high, hunger remains prevalent, and income inequality is widening and deepening. While the majority of the poor are in the rural areas, women in particular are generally the most disadvantaged.

People in Dinkia, India suffer from water shortage. Climate change make them more vulnerable.

The region is also characterized by people's marginalization from resources, markets and services, coupled with a lack of social services. There is a high incidence of internal displacement, as people are forced to leave their homes by physical and economic factors or by armed conflict. Eviction and dislocation caused by 'development projects' are also creating 'development refugees'. There are also high incidences of human rights violations (including trafficking and forced prostitution) and political repression. Governance is generally characterized by a lack of transparency and accountability and, in some cases, large-scale corruption.

In many areas, the environment is already severely degraded due to the over-exploitation of natural resources, including logging, mining, hydropower dams and other forms of extraction and plunder. Land, water, and other natural resources and capital, continue to be concentrated in the hands of a few elite families. Land reforms are generally unsuccessful in equitably distributing land and other agricultural resources, while social capital has not been invested in building indigenous knowledge, technology and infrastructure, much less in adapting to climate change.

Governments' approach to 'development' has followed the tradition of economic liberalisation: Planning, design and implementation of development projects, including those concerning adaptation to climate change, have been privatized or are dependent upon foreign debt. Under pres-



Photo by Joanna Levitte, International/Accountability Project

sure from the globalization agenda, governments have defaulted on actively raising income levels, production subsidies, price controls, education and technical skills, food distribution, health care, and disaster preparedness. They have neglected the most economically and climatically vulnerable sectors, such as small-scale farmers and fishers, Indigenous Peoples, mountain and forest dwellers, upland farmers and pastoralists.

All these factors exacerbate the general vulnerability of communities in the Asia Pacific region, and demand a response to climate change that is based on justice and addresses systemic economic and social vulnerability.

Climate justice ultimately means that all people have the right to an equitable share of the world's natural resources, within ecological limits. It means redressing inequalities of wealth, power and access to the Earth's resources. To achieve climate justice, the world's greatest per capita polluters must make deep cuts in emissions by changing our polluting way of life and climate-intensive economies. It is time to reverse the export-market-oriented development paradigm imposed on the South, and create an alternative vision of sustainable societies based on sovereignty, solidarity and sufficiency. In short, the Global North must repay its climate debt.

Although rapidly industrializing Southern nations, such as China, do have rising levels of greenhouse gas emissions, the Global North, including Australia, the US and Western Europe, continues to be the major source of excessive per capita greenhouse gas pollution. Taking account of current emissions as well as historic ones, it is clear that the climate debt the citizens of the North owe to the rest of the planet's inhabitants is still growing.

Justice for this debt must be at the core of our response to global warming. To be effective in a world with enormous (and still increasing) gaps between rich and poor, multilateral negotiations and treaties on climate change must enshrine a rights-based approach to limit the levels of greenhouse gases

that can be created. This is at odds with the current 'business as usual' approach to tackling global warming favoured by many governments and corporate players, which assumes that current production and consumption rates and lifestyles can continue so long as we pay for reduced emissions through improved technology, or by 'offsetting' our emissions by buying carbon credits on international markets.

The North's climate debt is a part of a wider ecological debt. Since the time of Christopher Columbus, resources, materials and commodities have flowed from the New World to the people and economies of the Old World, today's Global North. While we live in an era seemingly far removed from colonial times, there can be little doubt that the structures and relations created in those times persist, in the South's financial indebtedness to Northern nations, in unfair trading relations, and in the great and growing disparity between rich and poor.

This North-South relationship and ecological debt must be viewed in a new light on a warming planet. With the advent of climate change, whole economies in the South will be devastated, like Northern nations, however, the Global South lacks the safety nets that allow a rapid response and a return to normality after climate disasters, such as insurance, budget surpluses and emergency infrastructure. So on top of losses to storms and floods, impoverished nations face the prospect of having to borrow yet more money from the very countries who produced most of the greenhouse gases and colonized their ecological resources in the first place.

It should also be remembered that most Southern countries are locked into repaying existing external debt and are driven to exporting natural and human resources to generate currency, often without benefits returning to local economies. This creates many problems, environmental and social, in the

People in Carteret Islands are already impacted by sea level rise. It is estimated that 200 million people in Asia Pacific will be displaced by the climate change by 2050.



country of origin, while consumers in Northern countries get cheap timber, beef, gold, coffee and other commodities. In the last few decades, the International Monetary Fund and World Bank have imposed 'structural adjustment programs' as a condition of financial support. This has led to forced privatization of public utilities and austerity measures, leading to the loss of public infrastructure that is a vital buffer against natural disasters. The promotion of economic specialization may also prove disastrous in a warming world.

Some argue that believing that the rich will own up to their climate debt is a pipe dream. Yet, in terms of human history it is only a short time since slavery was abolished across most of the world, and women in many countries enfranchised. Furthermore, a growing number of people and governments now accept that climate change is real. Now is the time to take on the challenge of acknowledging climate debt. This recognition could make us all—North and South—stronger and better able to live with the changing conditions that will come with global warming.

With just one planet we must accept that all of us, regardless of race, class, ethnicity or gender, have an equal right to a fair share of resources which will allow for a life of dignity. And we must build new ways of living which account for historical greenhouse gas emissions. To simply start anew from the status quo is not enough: many already carry an unjust burden, many more will inherit one. Recognition of climate debt can help us understand how we might share the atmosphere in the future. By accepting the debt, we can move towards stopping it increasing, repaying it and making provision for the needs of future generations. To make amends, our response to climate change must include a commitment to global equity and genuine resource and technology sharing, to aid and reconstruction, and to transforming the export-focused economic development paradigm to one of genuinely sustainable, just and rights-based societies. To do anything less risks the sovereignty and survival of all peoples of the Asia Pacific region.

Flood damage in Pakistan, 2007. Flood situation was further exacerbated by Cyclone 'Yemyin' in late June 2007. More than 2.5 million people affected with 176 dead in Baluchistan and Sindh Province.

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Photo by Mustafa Talpur, Action Aid, Pakistan

Overview: The ADB and Climate Change

Hemantha Withanage

Centre for Environmental Justice -Friends of the Earth Sri Lanka

The Asian Development Bank, a major donor and the regional bank in the Asia Pacific region plays a major role in climate change. According to the ADB's new vision "Strategy 2020" the ADB will help its Developing Member Countries (DMCs) move their economies onto low-carbon growth paths by: (a) improving energy efficiency; (b) expanding the use of clean energy sources; (c) reducing fugitive greenhouse gas emissions, such as methane released from landfills; (d) modernizing public transport systems; and (e) arresting deforestation."¹

As per the information ADB will also help DMCs adapt to the unavoidable impacts of climate change—including those related to health—through national and municipal planning, investments in defensive measures, support for insurance and other risk-sharing instruments, and "climate-proofing" projects. It will also play a major role in disaster risk management. Sustainable management of forest and other natural resources for provision of clean water supplies, protection of biological diversity, and sequestration of carbon from the atmosphere to offset greenhouse gas emissions will also be part of ADB's assistance to address climate change.

Under its "Livable Cities" concept, the ADB will assist to reduce the carbon footprint of Asia's cities i.e., the amount of harmful greenhouse gases produced. The ADB will assist DMCs and their municipalities in addressing a range of

environmental problems resulting from rapid urbanization. These include reducing air and water pollution, supporting cleaner modes of transport, improving systems for solid waste management, and reducing urban waste.

ADB climate related funds:

ADB has so far committed to establish and manage the following climate change funds:

- Clean Energy Financing Partnership Facility (CEFPF): \$90 million;
- Adaptation Funds managed by ADB Small Grants for Promoting Climate Change Adaptation in Asia and the Pacific: \$1.2 million;
- Water Financing Partnership Facility (WFPP): \$65 million; to mobilise co-financing and investments on the delivery of water investments, reform, and capacity development including flood control, as a key component of climate change adaptation in the region;
- Poverty and Environment Fund (PEF): \$3.6 million, including adaptation which is a multi-donor trust fund administered by ADB that focuses on poverty-environment linkages, including the reduction of vulnerability to natural hazards and disaster prevention.

ADB also manages cross cutting funds such as the Climate Change Fund (CCF): \$40 million - to facilitate greater investments in developing countries in Asia and the Pacific to address the causes and consequences of global warming.



Water, firewood, education, health, transport and livelihood in Kulna Jessore Development and Rehabilitation project in Bangladesh, funded by the ADB is a catastrophe. Lack of climate impacts assessment climate change aggravate the sufferings of these people.

There are several funds managed by the ADB Partners including Global Environment Facility (GEF). GEF funds are supposed to assist developing countries undertake projects to mitigate the effects of climate change, while also benefiting local economies and helping improve local environmental conditions. According to the ADB, GEF funds also support interventions that increase resilience to the adverse impacts of climate change on vulnerable countries, sectors, and communities. Meanwhile Climate Investment Funds (CIF), administered by the World Bank and implemented together with ADB and other regional development banks, are also promoted as a means of assisting in mitigation and adaptation to climate change. The Clean Technology Fund (CTF), which is one of the two trust funds, provides large-scale financial resources to invest in projects and programs in developing countries which contribute to the demonstration, deployment, and transfer of low-carbon technologies. Strategic Climate Fund (SCF) serves as an overarching fund for various programs to test innovative approaches to climate change.

The ADB also established the Energy Efficiency Initiative (EEI) in 2005 as part of its effort to increase energy security and to help mitigate the region's growing greenhouse gas (GHG) emissions from the use of energy. In 2005 ADB established the (EEI) to promote greater investments in energy efficiency and renewable energy within the region and to increase ADB's lending in these two sub-sectors to \$1 billion per year from 2008 to 2010.²

ADB renewable Energy projects

The ADB states it has provided close to US\$2 billion in assistance for energy and environment-related projects in the past two decades. These projects involve construction and operation of 49.5 MW wind power generation facilities which will generate an average of 133 Gwh of electricity annually in China. According to the ADB, the project avoids generation of 140,000 tons CO₂ annually. Meanwhile, a project in India i.e Gujarat Paguthan Wind Energy Financing Facility,

Mae Moh coal power plant in Southern Thailand. According to Greenpeace Asia the Mae Moh power plant releases approximately more than four million tons of carbon dioxide emissions to the atmosphere, annually.

which is part of the Samana Wind Power Project, will generate 100.8 MW of wind power. Also CLP India Wind Farms Private Limited (Samana Phase 2 Project & Saudatti Project) involves the construction and operation of 82.4 MW of wind power generation facilities.

ADB support Coal Power

However, the ADB is infamous because of its support for a number of coal powered projects in the 80s and in the recent times. One of the most controversial projects is 2,400 MW Mae Moh coal power plant in Southern Thailand. According to Greenpeace Asia the Mae Moh power plant releases approximately more than four million tons of carbon dioxide emissions to the atmosphere, annually. In addition, around 1.6 million tons of sulphur gas is released from the power plant into the air everyday. Such emissions have caused severe health problems for the people near the site and have led to the deterioration of the environment. More than 200 people have died due to respiratory diseases and lung cancer ever since Mae Moh power plant was operated.³

From the time of the implementation of the Mae Moh coal power plant, more than 30,000 people have been displaced and thousands acquired severe respiratory problems. This was due to the inhalation and exposure to sulphur dioxide emitted from the mine.

The energy policy of the ADB still supports high pollution coal power plants. The 2000 Energy Strategy states "ADB will assist its DMCs in assimilating and commercializing advanced technologies for coal washing and extraction of coal bed methane, and in promoting the use of clean coal



Photo by Yvan Cohen/Asiaworksphotos.com

technologies such as fluidized bed combustion, supercritical boiler plants, integrated coal gasification combined cycle, catalytic reduction, bag house filters, electrostatic precipitators, and flue gas desulphurization." The 2006 review, which ADB aspires to becoming new policy states "To meet the electricity needs of the region, large capacity additions will be required for which coal based generation will grow. ADB will encourage as fluidized bed combustion, supercritical and ultra supercritical boilers, and flue gas desulphurization. As the new technologies - like integrated gasification combined cycle- and carbon capture and storage (or sequestration) are shown to be technically feasible and economically viable, the ADB will support the deployment of such technologies in DMCs in order to increase their financial viability."

ADB currently supports the project to construct, operate, and maintain a 4,000 MW coal-fired power plant with five units of 800 MW each, incorporating more energy efficient supercritical technology near Tundawanda village, Mundra Taluka in Kutch district, in the state of Gujarat. The fund also supports Masinloc Coal-Fired Power Project. This project involves acquisition, rehabilitation, and operation of the existing 600 megawatt (MW) Masinloc coal-fired thermal power plant in Zambales province in the Philippines. It will also support Calaca Coal-Fired Thermal Power Plant Project which involves refurbishment of the 600 MW base-load pulverized coal-fired power plant.

When ADB spends USD 2 billion in climate change it also spends a similar amount or more money for projects that produce GHG.

This ADB double-standard makes the people and the environment more vulnerable to climate change while continuing its 'business as usual' in our region. There is no more room for 'business as usual' as climate change is already affecting the people and the environment of the Asia Pacific region, We are currently at the cusp of dangerous climate change and global climatic tipping points. The ADB's climate initiatives, so far are acts of window-dressing and we can no longer afford to dress the windows of big polluters.

Footnotes

1 www.adb.org

2 <http://www.adb.org/Clean-Energy/eei.asp>

3 *Development Debacles NGO Forum on ADB , 2007*

4 Rosien, Jessica. "ADB's Dirty Involvement in Coal-Fired Power." *Bankwatch. Vol. III, Is. 2, December 2004.*



ADB supports Asia Energy to mine coal in Phulbari area in Bangladesh. People's opposition against the project led the Bangladesh government to produce a Coal Mining Policy. According to the ADB president, this coal mining is necessary for the Bangladesh poverty alleviation effort. Yet it will displace over 50,000 families living in the area creating more poverty.

Sri Lanka: Climate impacts of the Southern Transport Development Project

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The Southern Transport Development Project (STDP) in Sri Lanka, funded by the Asian Development Bank and the Japan Bank for International Cooperation (JBIC), is one of the most controversial bank-funded projects since 1994 which is not yet completed. So far, the ADB has contributed US\$ 821 million to the project, including supplementary loans. The Japan International Cooperation Agency (JICA) has given another US\$ 180 million.

The project is a 128 km, six-lane toll expressway, linking the cities of Colombo and Matara in the south of Sri Lanka. The road, which crosses five major river basins, is being constructed on a 'cut and fill' basis: cuttings are made through high ground, and lowland paddy fields and marshes are filled in. The area along in which the highway is being built is prone to flooding.

The highway project started in 1994. In 1996, the ADB assisted the Sri Lankan Road Development Authority (RDA) in producing an Environmental Impact Assessment (EIA) report, which was released in 1999. A supplementary EIA was released in 2005 in order to release the second ADB grant. No climate impact assessment was conducted during the design or implementation stages, even though there are numerous practical ways in which the project's climate impacts could have been reduced.

One of the initial controversies with the project was the large number of communities that would be affected and the inadequate compensation offered to them. Following a series of court cases and complaints to the ADB Accountability Mechanism, many received satisfactory compensation. However, the project has many other social and environmental aspects which have been neglected. Furthermore, the limited EIA did not cover the full route of the road: a stretch of some 40 km long was excluded. The EIA only looked at alternative sites to reduce displacement. It did not look at the issues of flooding and waterlogging.

STDP is a cut and fill basis project. All soil come from the hillocks are used for filling wetlands, blocking waterways, creating floods during the rainy season. No climate impacts were considered during the EIA and feasibility stage.

Project impacts

Once open, the expressway will have the positive impact of reducing the journey time between the two cities – but only for those who can afford to pay the toll of between three to nine rupees per kilometre depending on vehicle class. This will put travel on the expressway out of the reach of many who use the existing A2 road. The project also has many negative social and environmental impacts:

Displacement: The EIA originally estimated that 5,683 households would be affected by the acquisition of land for the expressway, of which 1,315 would lose their homesteads, and be forced to relocate elsewhere. According to the information available from the Road Development Authority, in July 2006 the number of households affected had already reached about 5,800 and some 19,340 individuals had been affected.

Flooding: The expressway crosses five river basins. As much of the road is raised above ground level, the existing drainage systems have been blocked in the process and are consequently unable to deal with heavy rain, which floods adjacent gardens. The road itself effectively acts as a dam. Frequent flooding is observed, even after short periods of rain; most of the areas affected have never been subject to floods before. Flooding also increases waterlogging, which destroys paddy fields and reduces farm yields. It also threatens to damage the expressway itself.



Photo by Hemantha Withanage

Dust: Dust creation is a significant problem and no adequate measures have been taken to address it. The levelling of mountains and rock blasting have made the soil unstable. Soil erosion is very high in the project site. Thousands of people, especially children, are suffering from dust-related diseases such as coughs, asthma and other respiratory illnesses. To overcome this, it was proposed to wet the roads frequently; at present this procedure is neglected in most areas.

Damage to buildings: Rock blasting and vehicle movement have indirectly damaged houses. Almost all the houses close to construction sites, in all locations, have cracks in their walls.

Damage to paddy fields: Farming has been affected by the collection of sediment in paddy fields. Ploughing has become difficult as thick sediment deposits become compacted. Floodwater surges can wash the banks of the paddy fields away. When this happens in the paddy sowing period, farmers have to sow several times. Some paddy fields around the Sulthanagoda area (near the Matara end of the expressway) have been abandoned.

Damage to wetlands: More than 70 per cent of the route crosses wetlands. Construction involves opening up the wetland soil and removing mud to stabilize the road basement. According to the supplementary EIA, large amounts of soft black organic soil had to be removed in more than 60 locations in the section funded by the ADB.

Contamination and drying of water sources: Construction involves removing metals from the soil, which, more often than not, are not disposed of properly, and can contaminate drinking water in the area. Draining water from the wetlands has lowered the water table, causing wells used for drinking water to dry up. This is a common phenomenon in all adjacent villages, and has even been observed in locations up to a kilometer from the road. Wells that never ran dry, even during severe drought, now have only one or two feet of water. As the water level decreases, the remaining water starts emitting a bad odour which people have described as similar to kerosene.

New houses of the displaced people and many others face annual flooding along the roadway due to blocking of natural waterways, filling wetlands.

Acidification: As the wetlands are excavated, acid sulphate soil is exposed, which alters soil conditions and may cause adverse impacts to agriculture.

Loss of tree cover: Cutting down of trees in the 1,079 hectares acquired by the project caused a huge loss of vegetation. The Supplementary EIA, section 70, stated: "Given the substantial areas that may require removal of woodland, the landowners should be given the opportunity to reinstate the woodland in the long term and a plantation compensation plan should be drawn up to replant the woodland. In the event that the land is not suitable for plantation then other areas should be identified to replace the cut trees and sufficient areas should be identified to allow plantation of trees at a rate of up to about 3:1. The ADB Stage 1 designs indicate planting of trees at intersections in the amenity areas; this should be retained as the Southern Expressway designs for all the Final Trace are implemented. The replacement ratio should be increased if necessary to allow for a high mortality rate among the newly planted trees based on advice from the district forest officer". Despite the fact that plantations cannot replace the biodiversity lost in natural forest or woodlands, nor of the substantial tracks of land required to compensate the clearing for the project, the ADB recommended replanting has not been carried out.

Air pollution: Air pollution has not been modeled according to the supplementary EIA: "In the absence of any definitive traffic modeling at this stage, the base air quality model run traffic flows are assumed to be 10,800 vehicles/day (about 1,000 vehicles/hr peak). The model predicts that the maximum permissible levels of the indicator pollutant nitrogen dioxide will not be exceeded even on the carriageway." There is no modeling of the CO₂ or other greenhouse gas emissions from the expressway.



Climate impact assessment and climate proofing

Neither the STDP's potential impacts on the climate nor its resilience to future climate change have been adequately assessed, before or during construction.

A thorough assessment of climate impacts and of climate resilience should be fundamental to any infrastructure project, especially such a major project as this. Important aspects to assess include location, site layout, structures, drainage, risk of floods and landslides, impacts due to temperature, impacts on water resources, and risk of subsidence (which is likely to be exacerbated during dry summers due to climate change, putting the development itself at risk).

In the absence of an assessment, it is impossible to estimate the STDP's net contribution to CO₂ and greenhouse gas emissions.

While the project will reduce travel time between the two cities and points between, thereby reducing fuel consumption by those vehicles that would have made the journey anyway. Additionally, it is well established that road-building leads to an increase in traffic and therefore the net result of this project is likely to be an increase in emissions from traffic.

The project is also responsible for the clearing of forests, which releases stored carbon, and the draining and excavation of wetlands, which results in the emission of methane, a potent greenhouse gas.

Alternatives ignored

The RDA and the Banks have not integrated climate mitigation measures and climate proofing into the project design. Had they conducted a proper climate assessment, they could have considered alternative approaches which could have made the project more climate friendly.

For example, elevating the expressway on stilts would have reduced the damage to the wetlands and reduced flooding. Instead of excavating and removing wetland soil, they should have used an impermeable layer underneath the

road. Improving and expanding the existing road, or limiting it to a two-lane highway while increasing mass transport options, would have vastly reduced the impacts. Reducing the need for clearing trees, and planting more trees, would have helped minimize the project's climate impact.

Conclusion

The STDP project may have some minimal positive climate impacts, but these are clearly outweighed by the very significant negative impacts, that arise mostly because of the disregard shown to the environment. Neglecting climate impacts creates projects that not only contribute to but are themselves at risk from future climate related disasters.

Open dumping of Acid Sulphate soil in more than sixty places have destroyed the drinking water wells.



Indonesia: ADB's climate account in Indonesia

Muhammad Teguh Surya

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The Asian Development Bank (ADB) gave its first loan to the Indonesian government in 1969 for an irrigation project. By the end of 2007, the Indonesian government received 291 loans amounting to \$22.56 billion, and 491 technical assistance (TA) projects amounting to \$253.66 million. Indonesia is the ADB's largest client. At least 70% of ADB projects in Indonesia are categorized by the ADB as economically or socially long-term benefits for Indonesia¹. However, these so-called long-term benefits have created catastrophic indebtedness for Indonesia.

The ADB is worthy to be called the "Asian Destructive Bank" considering their loan-based development rhetoric for economic improvement which never happens. The ADB's so called long-term benefits is a never ending catastrophe with a multiplier effect.

In the 2009 State Budget, the money paid for principal debt and interest installments is Rp 162 trillion (Indonesian Rupiah). The amount is far larger than the allocation for the national development program where budget allocations are only around Rp 8 trillion for Agriculture Ministry, Rp 62 trillion for Education Ministry, Rp 20 trillion for Health Ministry, Rp 3.4 trillion for Fishery and Sea Ministry, and only Rp 376 billion for Environment Ministry. One can imagine what kind of development can happen in Indonesia given the budget allocation which is heavily geared towards debt payment.

Further to the environmental and social catastrophe, ADB has many projects which contribute to Indonesia's climate catastrophe.

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Scale of forest destruction in Ache. Indonesia has the highest annual rate of deforestation with 1.8 million hectares (4.4 million acres) of forest destroyed each year between 2000-2005

Aquaculture destruction

The ADB's lending in aquaculture industry expansion in Indonesia since 1980s, also contributed to the loss of mangrove forests in the coastal region of Indonesia (see table 1 below). The mangrove forest cover decreased from 2.4 million hectares in 1982 to currently 1.9 million hectares. This is alarming for communities living around these coastal areas who are dependent on mangroves for their lives and livelihoods. Mangroves are the fishing grounds, food sources for communities and serve as natural shields against disasters such as storm surges and high tide waves – known as the 'Rob'². These mangroves protect communities and natural habitats from sea ingression as a result of climate change³. Moreover, mangroves function as a "coastal green belt" where mangroves capture CO₂ from the atmosphere.

Recently, the ADB, through Sustainable Aquaculture Development for Food Security and Poverty Reduction Project (2006-2013), funded \$ 33.30 million together with Langkat Regency administration in Northern Sumatra province and two palm plantations (i.e. PT. Sawita and PT). Pelita Nusantara Sejahtera converted 1,300 hectare mangrove forests to Oil Palm plantations in Lubuk Kertang village in West Brandan District. However, the area was used and communally cultivated for empang paluh⁵ to catch crabs, shrimps and



Photo c/o Ruffie, Ache

other fishery activities. It is so important for the community to preserve mangrove forests because communities have a sustainable co-existence with these mangrove forests. The mangrove forest land is also the GERHAN⁶ (Land and Forest Rehabilitation Movement) area based on the cooperation agreement letter between Mangrove Fisher Farmers Group (Mekar) and Langkat Regency Forestry Duty dated 3 April 2006 and Langkat Regency Head Decree No. 522.4-16.a/SK/2006 dated 3 April, about Farmer Group Establishment to Execute and Work on Land and Forest Rehabilitation National Movement Activity (GN-RHL/ GERHAN)DIPA-L for the year of 2006.

Unfortunately, the ADB or any climate agency has not done a calculation of the climate impacts by the destruction of these mangrove forests.

The impact of aquaculture expansion by the ADB is not limited to the mangroves. An ADB funded US\$29.5 billion for industrial plantation credit projects was a total failure. The fund which was allocated for Bank Bumi Daya Capital was used to fund shrimp pools which emitted and disposed poisonous wastes, directly damaging the sea environment. From this allocation, about three to five projects completely failed and 90 percent of them could not repay their loans. (See *Table 1. ADB and World Bank Debt Fund for Aquaculture Development In Indonesia for the Period of 1982 - 2005*)

“d-extractive” industry

The ADB loaned as much as US\$ 30 million for the Tangguh liquid natural gas (LNG) project in the Bintuni Bay in West Papua. This project, which is managed by British Petroleum (BP), harms and adversely impacts the Indigenous Peoples of Saway, Wayuni and Simuna in West Papua. These Indigenous Peoples have lost their control, access and rights over their lands and other natural sources from which they are dependent⁷.

The projects supported by the ADB failed to ensure the the involvement of the communities around the project and the bank's own commitment to good governance and transparency. There are no documents nor information available in Bahasa or in their local dialects and ironically an important aspect for people's participation in informed decision-making processes as preached by the ADB .

A letter sent by Papua Baptist Church Leader, Priest Socratez Sofyan Yoman to BP, in July 2005⁸ points clearly to what is happening on the ground. An excerpt of the letter exposed the realities experienced by the people of West Papua and condemned BP of its lies:

“the websites and brochures you published say that whatever happen in your ‘project area’ are all alright. You say having built a new village and trying to be careful not to disturb shrimp fishing in our waters. You demonstrate smiling Papua

Table 1. ADB and World Bank Debt Fund for Aquaculture Development In Indonesia for the Period of 1982 - 2005

Project name	Donor	Debt/ grant	Cost of project	Year of Agreement Program
Brackishwater Aquaculture Development ¹	ADB	Debt	US\$ 23 million	1982
Second Brackishwater Aquaculture Development ¹	ADB	Debt	US\$ 38 million	1989
Brackishwater Aquaculture Development ¹	ADB	Debt	US\$ 100 thousand	1981
Second Brackiswater Aquaculture Development ¹	ADB	Debt	US\$ 260 thousand	1984
A Study on Shrimp Health Management and Disease Control ¹	ADB	Debt	US\$ 400 thousand	1992
PT. Central Pertiwi Bahari ²	IFC	Debt	US\$ 45 million	2005

Sources: 1. Sofa (2000), Hanson dkk (2003), ADB (1997, 2000, 2001, 2002, 2005, 2006), World Bank (2006)
<http://www.ifc.org/ifcext/spiwebsite1.nsf/1ca07340e47a35cd85256efb00700cee/8FAE3DF62B0CB94F852570B90054D759>

children pictures, but you do not disclose that outside of your 'project area', our people are assassinated like pigs by the authorities you welcome by tea time in Jakarta and Jayapura. What are your rights of taking a single part of our land and saying that everything in your 'area' are just alright?"

What is most surprising are the environmental assessment documents prepared by Tangguh, which were summarized and reviewed by the ADB. The environmental assessment documents stated that the project will produce 7.5 million tons LNG per year and will emit 25.57 million tons of CO₂ per year. Yet, the ADB still concludes that the Tangguh project is in accordance with the ADB's energy policy which supports clean energy development through private sector participation. Thus, demonstrating that ADB is falsely defining LNG, a fossil fuel, as environmental-friendly 'clean fuel' to promote to other countries in the region, especially in China and in Korea⁹.

British Petroleum also admits that as a result of their production activities in 2004, greenhouse gas (GHG) emissions have increased by more than 85 million tons. This is nearly a 1.6 million tons increase from the previous year. The amount generally calculates about twice of Argentina's GHG emissions. BP's fuel product usage also contributes to 1.376 billion tons of GHG increase, reaching about 5% global GHG emissions for this single transnational corporation¹⁰.

Extending Climate Impacts

Several examples and explanations given above at least describe that the "development" terminology touted by the ADB is just a mask to reap economic profit, while accelerating the destruction of the earth by funding ill-designed projects which are damaging the environment and violating human rights.

Yet, the current situation will not deter the Indonesian government to ask for more funds from the ADB. Together with the developed countries (G8) in Washington on 1-2 April 2009, the Indonesian government agreed to structural reform measures to rescue the global economic crisis through market principles. The strategy was to enforce investment and free

trade regimes and improve the roles of international financial institutions (IFIs) such as the International Monetary Fund, the World Bank, the Asian Development Bank, etc. The role of the IFIs would be focused on driving the development agenda and increasing (loan) aids flowing for crisis-impacted countries, including directing development banks to give funds as much as US\$ 150 billion, to help the developing countries¹¹.

Peversely, and despite Indonesia's debts to the ADB, the Indonesian government plans to inject additional capital of as much as Rp 400 billion to the ADB by 2014. The government's logic is that if it adds to the capital of the ADB, the government will get a loan facility as much as \$ 1 billion annually from the ADB. It is such an incomprehensible logic!

Conclusion

The Indonesian government should demand the debt clearance for those projects which are abusive and worsened the debt trap, instead of maintaining the role of ADB in developing the country. Furthermore, government should also insist ADB to restore the damaged ecosystem which has been caused as a result of its project. This action must be done to ensure the achievement of sustainable livelihood with ecological and economic justice in the future.

Destruction of Mangrove forest in Indonesia. The mangrove forest cover decreased from 2.4 million hectares in 1982 to currently 1.9 million hectares.



Photo c/o WALHI, FOE Indonesia

Footnotes

- 1 *Down to Earth* (2001). Facts sheet - International Finance Institutions, Down To Earth, No. 12, May 2001. ADB Evaluation in Indonesia : Operation Succeeds but The Patients Die. [online] : <http://dte.gn.apc.org/Aif12.htm>
- 2 The 'Rob' is the floods caused by tide of sea water inundating the land, the problem in areas which are lower than sea surface level. In Semarang, the Rob has become more severe because the land surface declines (erodes) while the sea surface rises due to the rise in earth temperature rise. [online] : (<http://id.wikipedia.org/wiki/Rob>)
- 3 Wetlands International, WWF Indonesia. Green Coast "For Nature and People After The Tsunami" [online] : <http://www.wetlands.or.id/PDF/Profil%20Sylvofishery.pdf>.
- 4 Media Indonesia, (2004). "70% ADB Projects in Indonesia Fail" Media Indonesia, 19 May 2004.. [online] : <http://els.bappenas.go.id/..upload/other/70%20persen%20proyek-MI.htm>
- 5 "Empang paluh or empang parit is a system in which the fishers are allowed to develop fish cultivation orderly in damaged or unproductive forests of about 2-3 hectares. The cultivation area is dried when water recedes and as high as 0.5 metre at sea tides." Source : Darma Lubis (2006). Sinar Harapan. Menutup Kisah Kelam Pulau Jaring Halus. 14 January 2006. [online] : <http://www.sinarharapan.co.id/berita/0601/14/sh09.html>
- 6 GERHAN Project was firstly declared in 2003, based on three Minister Joint Decree, that is Security and Politics Co-ordinating Minister, People Welfare Co-ordinating Minister, and Economy Co-ordinating Minister. The execution regulation is in Forestry Minister Regulation No. 2 and 3 in 2004. Yet GERHAN target to reduce critical land as wide as 3 million hectares within 5 years, since 2003. Source [online] : http://www.walhi.or.id/kampanye/hutan/strukturisasi/050512_gerhan_sumseI_sp/
- 7 Jatam (2008). Tangguh Untuk ADB (Jepang)
- 8 *Down to Earth* (2006). ADB to Fund BP's Tangguh Gas Project . No. 68 February 2006 [online] : <http://dte.gn.apc.org/68adb.htm>
- 9 *Idem*
- 10 *Down to Earth* No.65, Mei 2005. Tangguh-Ignoring The Reality. [online] : <http://dte.gn.apc.org/65TAN.HTM>
- 11 WALHI, KAU, KIARA, JATAM, SP, SPI, SHI (2009). Cukup Sudah Jadi Bangsa Kuli, Bangkit Jadi Bangsa Mandiri. 16 March 2009



Bangladesh: Shrimp Cultivation Turned a Mangrove Forest into a Saline Desert

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The Sundarban, the world's largest stretch of mangrove ecosystem, declared a World Heritage Site is well-known for its unique mangrove ecosystem that provides an excellent floral, faunal, ecological and environmental ambience in a close network of mutual interdependence. This mangrove habitat along the coastline of Bangladesh has tremendous social and ecological value. It acts as a natural buffer from damages by tides and surges, and trapping sediments protect the coastal region from erosion and functions as a wind breaking barrier, minimizing the intensity of cyclonic storms.

The mangrove functions as a natural sewage treatment plant and an important carbon dioxide sink. It absorbs pollutants from both air and water. The mangrove plants have high percentage of tannin present in their barks and leaves, which can neutralize some of the industrial pollutants and reduce their detrimental effect. Mangroves also have potentially sustainable economic value in terms of food, medicine, honey, fuel, timber, wood chips, paper, charcoal, firewood, tannins, riverbank protection, flood runoff, shoreline protection and recreation. They provide essential ecological services that safeguard the security and wellbeing of coastal settlements and as such play a vital role. So the protection and conservation of mangroves is a must for safeguarding the coastal ecology and ecosystem. But the natural environment and coastal ecosystem of this World Heritage Site is under threat of physical disaster due to unscientific and excessive human interference. Mangroves are an integral part of tropical and subtropical coastal life. The increased destruction of these ecosystems can have a potentially profound effect on the coastal environment. With the increased destruction of mangrove habitats, the shoreline will be more exposed to erosion.

ADB support to aquaculture development in coastal area

Many factors contribute to mangrove forest loss. One of the most significant causes of mangrove forest loss has been the destructive production methods of export-oriented industrial shrimp aquaculture along the forests.

The Chokoria Sundarban, a unique mangrove patch of coastal land in the southeast of Bangladesh was once enriched with a notable diversity of plants and animals. The roots provided a safe shelter to the fish shrimp and aquatic reptiles. But, today, most trees, animals and fish species have disappeared. The area is a saline desert now that looks oppressively monotonous and lifeless.

Out of the total 21,020.45 acres of forest land in Chokoria, 18,500 acres of land were declared Reserved Forest while 2520.45 acres were declared Protected Forest by the Government in 1903 considering its uniqueness and the diversity it nurtured. It has been reported that from 7,938 hectares (ha) in 1976, the mangrove had been reduced to a mere 188 ha in 1995. Shrimp farms have replaced most of the once dense forests.

In 1929, the British government leased out 1,582 ha of Chokoria Sundarban to 262 landless families. The cutting of

Shrimp cultivation ruins the Chokoria Sundarban mangrove forest in Bangladesh with the financial support from the ADB and World Bank in order to produce shrimp for export market.



the mangrove thus began with human settlement. But deforestation reached an unprecedented scale in the 1970s and early 1980s when the Asian Development Bank (ADB) and the World Bank (WB) gave funds to the government to promote shrimp farming for export.

The ADB financing for shrimp farming came in 1982 under the Aquaculture Development Project. With the ADB loan of US \$15.99 million, 115 plots of 4.45 ha each and a 16-km embankment were built. The project helped to set up over a hundred shrimp farms, each eleven acres in size.

The ADB loan was followed by a US \$26.5 million shrimp culture project designed by the World Bank and United Nations Development Program (UNDP). The loan was used for infrastructure development, which included preparation of 468 plots of 4 ha each. After infrastructure development, like the construction of embankments and sluice gates and preparation of plots, the shrimp farms were leased out mainly to people from outside the area.

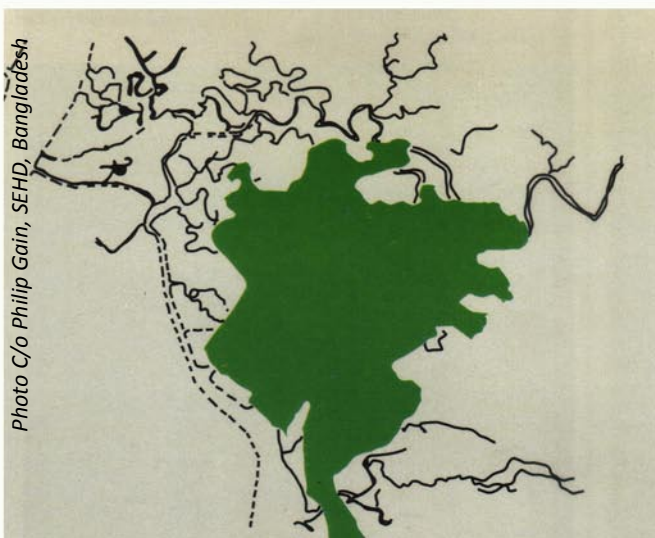
Directly following these periods of loans from the ADB and the World Bank, the Department of Forest was transferring tracks of mangrove forest over to the Department of Fisheries thus increasing the area for aquaculture cultivation: In 1997, the 228 ha of the mangrove forest was handed over to an influential person for shrimp cultivation. The following year, the Department of Forest handed over another 2,023 ha to the Department of Fisheries. And, in 1979, another 695 ha of forest land was given to the Department of Fisheries.

Ecocide of the Chokoria Sundarban

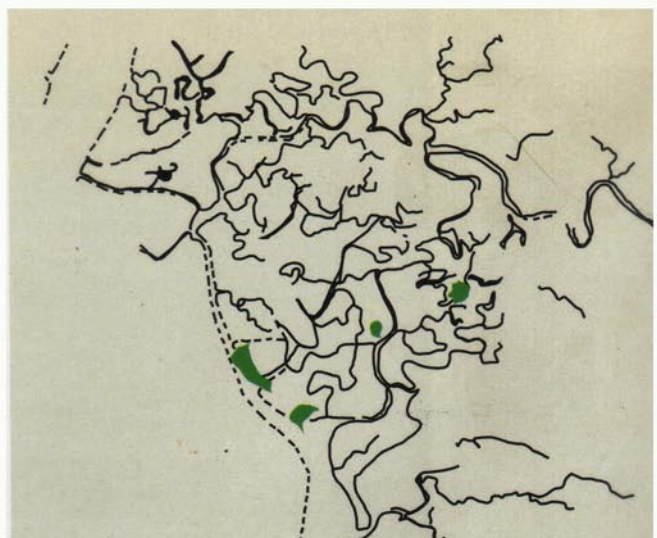
The ADB -funded project was completed in 1986, and the World Bank project was completed in 1993. The end result was the "ecocide" of the Chokoria Sundarban. Thousands of hectares of agricultural village land were converted to commercially-controlled ponds creating severe ecological problems and displacing whole communities from their lands. About 800 ha of mangrove forest was cleared to culture brackish water shrimp and the shrimp cultivation had wiped out the entire mangrove forest. The fact remains that the total of the 21,020.45 acres of the mangrove forest of Chokoria has lost its entire tree cover and now stands completely barren with no initiative from the government to regenerate the forest. This resulted in the loss of the unique biodiversity and the rich wildlife resources that the forest once had.

The local community people were never properly consulted about the implementation of the project. The project caused widespread protests from the affected communities and local NGOs, who criticized the so-called 'environmental conservation' project for failing to take into account the real forces causing damage to the ecosystem.

In its project completion report [1989], the ADB says: "...about 800 ha of mangrove forest was cleared to culture brackish water shrimp. A large portion of the approximately 100,000 ha of land now being utilized for shrimp culture in Bangladesh was originally mangrove forest. ...The clearing of 800 ha of mangrove in the Chokoria Sundarban under the Project has clearly reduced shrimp/fish breeding and nursery grounds in the area..."



1976 Chokoria Sundarban



1995 Chokoria Sundarban

The satellite images of the area reveal that in 1972, 19,390 acres were covered by forests in the Chokoria Sundarban. The images of 1974 and 1976 depict almost the same picture. In 1979, a portion of the forest at its Northwest corner disappeared. In 1981 the forest area decreased to 8,650 acres. In 1985, the forest came down to 4,072 acres. In 1991 even that was cut by half. In 1995, the forests completely vanished from the picture [Philip Gain, Stolen Forest, August 2006].

Impact of Forest Degradation and Depletion

Only a few individuals have benefited from this shrimp culture project which produced shrimp for the export market. The local environment and the means of livelihood of the local people have been greatly damaged and the human habitation has become more vulnerable to cyclones and tidal surges. The population of local fish species significantly decreased and some species have disappeared altogether.

The rate of forest extraction and the methods utilized have led to serious economic, social and environmental ill-effects including widespread soil erosion, increased sedimentation of reservoirs and irrigation systems, the destruction of agricultural lands and coastal areas and negative impacts on the sequestration of carbon for maintaining the climate. The soil of mangrove forest area contains acid sulphate in high concentration but mangrove trees prevent the increase in acid sulphate content. Experts fear that the shrimp culture can gradually increase acid sulphate in the soil to such an extent that regeneration of mangroves may become impossible. The land will be suitable for only salt and shrimp production.

ADB's policy on Forestry

One of the imperatives on which the bank's forestry policy is founded is 'Protection'. Following this imperative, the Bank's policy and strategy on forestry development in its activities and projects with Developing Member Countries (DMCs) is guided by principles. One of such principles has explicitly recognized the vital role of forests in maintaining biodiversity

More than 25,000 families in Kulna-Jessore area are living in a water logged land due to ADB funded KDRP project in Bangladesh. Their life more vulnerable to even a minor climate disaster.

values and in acting as a global carbon storage area as carbon sink, reducing air pollution and mitigating global warming. Clearly, the bank's aquaculture projects in Bangladesh have failed to meet these principles and rehabilitation of degraded and cleared mangrove forests is now an urgent priority.

Conclusion

The Bank's support for the development activity very much differs from its own policy on forestry. Though several attempts were made for replanting of mangrove trees near the Chokoria Sundarban area through various projects, the devastation made to the unique gift of nature can never be revitalized once they are entirely damaged.

In coastal areas, a slight rise in sea level makes the country extremely vulnerable as the protective mangrove forests have vanished. Once a forest has been cut down, precipitation decreases dramatically. Reforestation helps to stabilize the natural water cycle and subtract CO₂ from the atmosphere, but once a virgin forest is destroyed, it can never return to its original splendor.

Footnotes

1 hectare= 2.47 acres



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