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Short communication

Preparing for Myanmar's environment-friendly reform[☆]Changjian Wang^{a,b,*}, Fei Wang^{a,b}, Qiang Wang^{a,**}, Degang Yang^a,
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ABSTRACT

Recently, President U. Thein Sein of Myanmar addressed a “second wave of reforms”. Myanmar is opening up to the outside world after decades of seclusion. It is a resource-rich country, remaining a strong attraction to capitals around the world. Now, Myanmar's first priority is to pay close attention to social and economic development. But it is also a global biodiversity hotspot. Myanmar's local environment, biodiversity conservation and sustainable development are encountering many threats, such as construction of large dams, large-scale gas and oil extraction, illegal wildlife trade, and deforestation.

How to develop economy and at the same time suppress the environmental degradation especially preserve imperiled biodiversity will be a major challenge to Myanmar. This article attempts to answer this question according to actionable policies and measures mentioned in the context. Preparing for Myanmar's environment-friendly reform, Myanmar should improve its own economic capabilities, make scientific policies and improve management capacity in the first place. To make the on-going reform environment-friendly and stable, Myanmar also need aid package from the international community. Infrastructure construction should consider environmental issues, and industrial policies should aim at environment-friendly direction. It is quite necessary for Myanmar to establish a ministerial level environment agency that specially deals with environment and development issues, and invest more funds to carry out and enforce their environmental policies. In addition, the establishment of a special research center, think tank, and training facility within the country can be of great help in dealing with Myanmar's environmental issues. A series of policies and plans drafted in the early times for a system of protected areas could be revived and systematically implemented with effectiveness by means of more administrative support and enough human resources and budget allocation being provided.

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1. Introduction

Myanmar is a predominantly agricultural country in Mekong River Basin, also known as Burma, the second largest country in mainland South-East Asia, known as the “Asia’s Barn” in the past years, once the world’s largest exporter of rice. Myanmar is a resource-rich country that has abundant arable land, timber, mineral resources, natural gas and oil, which made it one of the best developing countries in South-East Asia until the early 1960s. Myanmar’s total area is 676 578 km². Forest area is 317 730 km², 48.32% of land area; other wooded land accounts for 30.59% of land area; other land accounts for 21.09% of land area, and inland water area is 19 030 km² (FAO, 2010). Extensive changes in altitude and latitude produced a seemingly unparalleled abundance of habitats and species. Myanmar occupied completely or partially nine of the Global 200 Eco-regions (Olson and Dinerstein, 2002). Indo-Burma includes most of Myanmar is described as one of the eight hottest biodiversity hotspots (Myers et al., 2000). There is no doubt that Myanmar has an unmatched level of biological diversity. Myanmar has 7000 plant species, has 1027 known bird species, 4 of which are endemic, and 19 others are restricted range birds. Myanmar is also home to 300 known species of mammals, 425 reptile and amphibian species, and 350 freshwater fish, especially the endangered species such as the *one-horned rhinoceros*, the *Irrawaddy Dolphin* and the *Gurney’s Pitta* (BEWG, 2011).

2. Reform process

Myanmar is an authoritarian state, which has been governed by successive military regimes. Long-term political and economic sanctions from the western countries on the military regime hindered the country from economic and social development. Vulnerable economy and governmental mismanagement have made it one of the poorest nations in South-East Asia.

Fortunately, under the leadership of President U. Thein Sein who is leading Myanmar’s reformation from military regime to embryonic democracy, a new government was established on 31 March 2011. Encouragingly, government is established after election, rather before election the openly contested by-elections on April 1, 2012 blew wind of change to the political situation in Myanmar (Webb et al., 2012).

The western countries then released positive signals to the government in reformation. U.S. has formally eased sanctions on Myanmar, so has Canada, Australia and the European Union, expecting for a possible investment boom (Lowrey, 2012). Myanmar’s environment is at a cross-road, its future depending on how recent reforms reshape the country (Schmidt, 2012). It is the new government’s first priority to solve the issue of social and economic development in advance.

3. Attracting the external world

Recently, President U. Thein Sein addressed a “second wave of reforms”. Myanmar is opening up to the outside world after

decades of seclusion. Its abundant natural resources remain a strong attraction to capitals around the world. Proven natural gas reserves in Myanmar is 0.22 trillion cubic meters at the end of 2011, and its annual production 11.2 million tons oil equivalent (BP, 2012). Natural gas exports account for about 71.8% of its production in 2009 (IEA, 2011). Myanmar also has large tracts of uncultivated land resources and mangrove forests, and bio-fuels accounts for 70.0% of total primary energy supply in 2009 (IEA, 2011).

If the reform is steady, foreign investments will bring earth-shaking changes to Myanmar’s extractive industries, especially natural gas and oil, deforestation, and mining, as well as the land resources and forest resources in the near future. General Electric and Coca Cola have announced plans to do business in Myanmar (Fuller, 2012). How to develop economy and at the same time suppress the environmental degradation especially preserve imperiled biodiversity will be a major challenge to Myanmar, a global biodiversity hotspot.

4. Improving its own economic strength

Myanmar now is a member in ASEAN Free Trade Area (AFTA) and the Greater Mekong Sub-regional Economic Cooperation Program (GMS Program). Furthermore, it should make more efforts to participate in the Asia-Pacific Economic Cooperation (APEC), in order to create a more favorable external environment for economic and social development. But the key point is that Myanmar should continuously improve its own economic strength.

Myanmar exports teakwood but imports non-finished teak products. It exports rubber, but imports tires (Perlez, 2012). Myanmar is the only teak-exporting country, which possesses the only remaining golden teak forests in the world. Although almost half of the world’s natural teak forests are growing in this country, natural teak-forests have decreased by 1.1 million hectare between 1992 and 2010 (Utkina, 2012). Large swathes of mangroves were also lost, as a result of timber production and exportation. Myanmar is one of the five countries (Indonesia, Australia, Myanmar, Madagascar and Mozambique) with the largest net loss of mangrove area during the period 2000–2010 (FAO, 2010). Forest area decreased from 392 180 km² in 1990 to 348 680 km² in 2000, then to 333 210 km² in 2005, finally to 317 730 km² in 2010. Annual change rate is –1.17% from 1990 to 2000, –0.90% from 2000 to 2005, –0.95% from 2005 to 2010 (FAO, 2010). There is still a lot of forest left in Myanmar, but most of it has been experiencing serious deforestation for decades. Increased agricultural conversion, fuel-wood consumption, charcoal production, and logging are major reasons for forest losses (Leimgruber et al., 2005).

Illegal wildlife trade is rampant in Myanmar. Wildlife trade earns much more than traditional farming for villagers living. Overexploitation for trade becomes the primary driver of illegal hunting, resulting in the valuable species’ decline or locally extinct (Rao et al., 2010). Illegal killing and capture of elephants for trade, especially for ivory trade, continues to be a major cause of decline for Myanmar’s wild Asian Elephant populations (Shepherd and Nijman, 2008). Land tenure remains very weak in Myanmar. The state owns all the land

and resources. A lack of land tenure and alternative income sources for living is the root cause of the wildlife trade (Schmidt, 2012).

Large-scale exploitation of natural resources may lead to environmental change and even loss of species and genetic materials that cannot be restored. Furthermore, biodiversity offers the essentials for human survival. That is why it is imperative to draw up and implement a plan for the biodiversity preservation in Myanmar immediately. Natural teak forests and mangroves should be protected under strict control with more effective measures. Myanmar should change the economic growth pattern, not export its abundant raw materials without thinking, but import high added value to improve the economic strength.

5. Infrastructure construction considering environmental issues

Although what Myanmar now needs most is economic aid and investment, the core national interests should be the people's living standard and biodiversity preservation. Large infrastructure must be conducting systematic surveys before the construction start.

The suspension of the Myitsone Dam on the Irrawaddy River supported by China in Kachin State was perceived as active steps toward environmental protection. The Irrawaddy, one of the world's top 30 high priority river basins due to high biodiversity and high vulnerability to future pressures, is the fifth most heavily silted river in the world (BRN, 2011). The Myitsone Dam will flood forests upstream and impact aquatic ecosystems, threatening hundreds of critically endemic and endangered animal and plant species, especially the endangered *Irrawaddy Dolphin* and *White-bellied Heron* (BANCA, 2009). In addition, the Tamanthi Dam on the Chindwin River will inundate globally endangered vital habitats like *Panthera tigris*, *Elephas maximus*, and *Kachuga travittata* which will become globally extinct species (BRN, 2012).

There are estimated about 48 hydropower projects currently planned, under construction or already in operational in Myanmar. Several dams in Myanmar are located in areas with global value biodiversity, which have not yet been systematically and properly surveyed. The rivers themselves are also home to rich biodiversity. The Salween River in Karen State near the Weigyi dam site lies fully within the Kayah-Karen Montane Rainforest eco-region. The Salween River has 200 animals and 194 plant species, 42 of which are endangered species, and still has some unknown and endemic species (KESAN, 2008). In addition, these large dams will directly affect fish migration routes and spawning grounds in the upstream.

The government must take environmental issues and biodiversity preservation in full consideration during the construction of transportation infrastructure, communications facilities, oil and natural gas pipelines, large power plants such as the Myitsone Dam supported by China et al. Large infrastructure construction should also employ Myanmar's employees to the biggest possible extent, in order to increase the income of the villagers.

6. Industrial policies aiming at environment-friendly direction

It is out of question that reforming Myanmar will draft exciting agricultural and industrial development plans. All attention should be paid to environmental protection in the process of industrial development at all levels. Government should prevent natural forests from converting into rice fields in the development of modern agriculture. The government should also upgrade the agricultural efficiency and reduce the use of pesticides, and strictly control the imports of high pollution and high emission industrial technologies from other countries and regions. It is reported that the toxic chemicals from gold extraction are seeping directly into the groundwater without been carefully cleared in the development of gold mining, especially in the Hukawng Valley in the Myitkyina District of Kachin State whose major industry is gold mining. Agricultural fertilizer, industrial wastes and oil and natural gas productions will result in air, water and soil contamination, which arise a series of ecological concerns endangering the biodiversity and even leading to the loss of biodiversity. Land degradation, loss of biodiversity, increasing energy demand, etc. may pose a serious question to the reforming government if the environment-friendly industrial policies are not in place.

7. Making scientific policies and improving management capacity

Myanmar cannot be separated from international community, but they need to constantly improve their own management capacity on themselves in the long run. Effective policy measures and sound environmental policy framework are the strong foundation for economic development. How to improve policy-making is a challenge for science-deprived countries like Myanmar. Scientists and educated class need concerted effort to input scientific elements into policy-making (Maslog, 2012). Scientists should make science popular and publicize its significance to society and environment, in order to create a scientific decision-making atmosphere during the process of environment-friendly reform and opening up. Government should loosen the controls on news media, promote discussion and publicity in the media, in order to guide citizens participate in decision making as key actors about their own livelihoods and make the world outside be aware of the new Myanmar at the same time. Furthermore, investment in elementary and high-school education should be increased significantly. It is reported that Myanmar's 36 protected areas, just 22 have forestry staff members (Schmidt, 2012). So the government should commit to invest more funds into R&D fields. The establishment of a special research center, think tank, and training facility within the country can be of great help in dealing with Myanmar's environmental issues.

Compared with other countries in the Indo-Burma hotspot, Myanmar's existing conservation investment is very limited. There is great and pressing need for additional conservation investment in Myanmar (UNEP & Birdlife International, 2005).

Foreign investment law should be enacted with legal authorities, effectiveness and high sense of responsibility to protect the foreign direct investment (FDI). When foreign direct investment (FDI) is poured into energy and extractive related sectors, necessary administrative, legal standards and adequate safeguards must be in place to ensure investment does not lead to unnecessary destruction of local natural environment and biodiversity conservation (BEWG, 2011).

To avoid conflicts of interest in the process of exploitation and utilization of resources, it is essential to set fair prices for ecosystem services that are now grossly underpriced to make compensations to residents living by natural resources (Liu and Diamond, 2005). The key is to take ecosystem both as the backbone of the local economy and as a haven for biodiversity to be protected. As a multi-ethnic country, Myanmar government should provide more analysis on conflict over natural resources, especially the social impact assessments in ethnic areas.

Although Myanmar has been a member in several international treaties relating to environment protection and biodiversity conservation, enforcement of these provisions is still a huge difficulty owing to lack of a ministerial level environment agency. The National Commission for Environmental Affairs (NCEAs) was established in 1990 to manage Myanmar's environment, but then transferred under the Ministry of Forestry in 2005. In order to protect biological resources from extinction, Myanmar needs to improve their governance by establishing an authoritative and necessary administrative department State Environmental Protection Administration, which is equivalent to the "China Council" that specially deals with environment and development issues, and invests more funds to carry out and enforce their environmental policies, according to the Convention on Biological Diversity (CBD), the Ramsar Convention (RC), the United Nations Framework Convention on Climate Change (UNFCCC) and their own special national environmental protection laws and measures incorporating with these treaties.

Encouragingly, except for the suspension of the Myitsone Dam supported by China and the Dawei coal fired power plant financed by Thailand on environmental and ecological grounds, the government then passed the country's first comprehensive environmental law that introduces environmental impact assessments into the approval of development projects (Schmidt, 2012). For instance, mining within 100 m of country's four largest rivers (the Irrawaddy, the Thanlwin, the Chindwinn, and the Sittaung) is now banned by a Ministry of Mines decree (Schmidt, 2012).

A series of National Environment Policy (1994), Myanmar Agenda 21 (1997) and the Environmental Impact Assessment Rules formulated by NCEA are recognized as some progress in environmental protection and economic development in the early times. There are also a drafted environmental law Community Forest Instructions (1995) and the Land Acquisition Act. These plans could be revived and systematically implemented with effectiveness by means of more administrative support and enough human resources and budget allocation being provided, would improve environmental protection and the land-based rights of local populations (BEWG, 2011).

8. Conclusion

In general, local leaders should make the on-going reform environment-friendly and stable. A sound policy framework for environmental protection and sustainable development is an urgent need. Policies and measures must be aiming at human development, economic development and biodiversity conservation. It is necessary for Myanmar to establish an authoritative and administrative department which is equivalent to the "China Council" that specially deals with environment and development issues. And the establishment of a special research center, think tank, and training facility within the country will be of great help. Government should guarantee that scientists directly engage in policy-making at all levels. Government should loosen the controls on news media to guide citizens participate in decision making as key actors about their own livelihoods and make the world outside be aware of the new Myanmar at the same time.

International community should give developing country such as Myanmar financial aid and technical expertise. International community should also help the government by putting forward environmental policy suggestions, and help supervise the implementation of the policy in bio-diverse and environmentally fragile regions. A series of policies and plans drafted in the early times for a system of protected areas could be revived and systematically implemented with effectiveness by means of more administrative support and enough human resources and budget allocation being provided. Government should try hard to enforce and implement environmental laws and regulations, invest more funds on biodiversity preservation, and focus on sustainable resources utilization. Leaders should always remember that the core interests are people's living standard and human development.

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