２０１２年プロジェクト補助金　報告書

『メコン河流域における環境悪化と農村共同体の対応』

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Ⅰ．研究プロジェクトの背景・問題提起

For the past decade, and particularly since the recession of 2008 - 2010, the ASEAN region has struggled to meet 2 objectives. One is to achieve equitable economic growth and development rather than development that widens gaps between rich and poor, or industrial development that destroys the environmental resources necessary to growth. The second objective is to standardize the regulations regarding labor, wages, and environmental protection in order to determine regional standards that can be met by all for the integration of the ASEAN Economic Community in 2015.

It is obvious that equitable and environmentally sustainable growth is difficult. Combined with the need to promote standard wages, working conditions, and environmental and resource protection policies, this difficulty has grown to nearly unmanageable levels. The ASEAN region is too diverse, both economically and environmentally, for agreements to be met at all levels of the economy (both formal and informal) and in terms of the extraction and use of resources.

The consequences of this difficulty are primarily that the informal economy has grown, pushing substandard wages and cross-border labor migration among small-scale industries; and that the illegal or hazardous extraction, refining, and production processes for environmental resources have become more numerous and widespread. Chief among the latter are the agricultural resources and environment that, in the developing countries of ASEAN, have been frantically pressured to produce enough for the enormous demands of the region, resulting in reliance on production and extraction methods that drive climate change to conditions much worse than those in developed countries.

Within ASEAN, the GMS (Greater Mekong Subregion) has experienced extreme climate change, severe natural disasters, and cumulative environmental damage. The region has thus borne the resulting losses of income, productivity, and manpower, as well as of environmental resources. These losses incur from short-term natural disasters as well as from long-term, ongoing environmental and resource degradation that also increases vulnerability and loss of resilience. In terms of natural disasters, Bindu Lohani, Vice President of the Asian Development Bank, reported that environmental disaster losses now account for higher amounts of money than the posted GDP growth rate in Asia (ADB 2013). The UNDP showed that exposure to such climate-change-induced problems as flooding has more than doubled within the past 20 years. The IPCC has repeatedly stressed that 98% of persons negatively affected by droughts, floods and disasters are in developing countries.

As a consequence of climate change induced severe environmental damage and resource loss, local, particularly rural, residents in extreme poverty lack resilience and may, to survive, adapt through further environmentally unsound practices (such as contracting with Chinese investors to engage in chemical agriculture, deforestation, and watershed diversion) and through permanent, unplanned migration. It was the purpose of this study to derive the rural dwellers' experience of recent, environmentally damaging climate change and their responses, particularly the response of illegal migration without return.

For these reasons this research, undertaken collaboratively with researchers from other institutions in Japan as well as Myanmar and Laos, surveyed both the environmental impacts of industrial development, climate change and global warming as well as the movement or migration of rural families in the most severely impacted areas. This interdisciplinary survey was implemented by a team including 1 social scientist (Lynn Thiesmeyer), 1 environmental chemist (Dr Yoshika Sekine), 1 botanist (Dr Win Myint), and 1 sustainable farming entrepreneur (Mr. Vorasone Dengkayaphichith). Two of the surveys (1 in Thailand and 1 in Myanmar) were accompanied by graduate students of this project at SFC (Mr Set Aung, D2; Mr Omair Qazi, M1; Ms. Hnin Myat Thu, M2; Mr. Wan Ko Ko, M2). The region focused on was the upper Mekong River region which is comprised of the border areas of 5 countries: the People's Republic of China, Myanmar, Laos, Vietnam and Thailand, while the 3 surveys undertaken in 2012 – 2013 for this project were based in Myanmar and Thailand.

ＩＩ．研究内容・研究活動・データ収集の方法やデータのカテゴリー

1. Regional Profile in terms of the research objectives (environmental damage and migration)

This research consisted of collecting, analyzing, publishing and reporting on the results of surveys made in 2 areas of the Upper GMS: 1) central, delta area, and upper Burma (Myanmar), and 2) Northern Thailand. This region, along with Northern Laos and southwestern China, has, just since 2010, experienced extreme drought, severe flooding, very rapid warming (in the case of Myanmar and Thailand, approximately 5 degrees C higher), super-typhoons, and delays or shortening of the rainy season. All of these events caused deaths in the hundreds, or even thousands, of population. At the same time there has been a noticeable rise in migrants, particularly destitute migrants, from these areas crossing borders into neighboring countries, usually by informal or illegal means. Normally these migrants originate from villages not far from the borders they cross. There was, however, the new phenomenon of migrants from much further away moving into the GMS: from India, Bangladesh, and the interior of China, as well as from central Myanmar to China or Northern Myanmar's Kachin State into Thailand. These latter have crossed a distance of up to 1,000 km in an attempt to escape environmental damage, destitution or starvation, and livelihood loss.

2. Locations

1) The first survey was made in Northern Thailand in the provinces of Chiang Mai and Chiang Rai, and on the Myanmar border (in the Shan State village of Wan Hpeng) in August 2012.
2) The second survey was conducted in Myanmar during September 2012, including Yangon and the Northern and Central cities of Sagaing, Mandalay, Myingyan, and Monhywa.
3) The third survey was made in Northern Thailand in an immigrant village (Kachin minority) of persons from Myanmar, near the border with Myanmar, in November 2012.
4) A fourth survey was supported by a different fund. It consisted of a follow-up in Myanmar and Thailand during February 2013. Some of the data are included here.

3. **Data categories:**

1) **Qualitative / Interviews.** Informants Total n= 64

1. Outmigration, Internal Migration, and In-migration, **to and from Myanmar**

a. Domestic climate migrants **within Myanmar**:
   ① From the Dry Zone to Yangon: 16
   ② From Delta of Myanmar to non-cyclone area of delta, OR to new EPZ, OR to industrial park outside Yangon: M2 student n=10 Thiesmeyer n= 2

b. Cross-border climate migrants **from Myanmar** to **China** and to **Thailand**
   ① To China: 2 in Thiesmeyer surveys, 21 in survey by M2 student
   ② To Thailand: 6 in Thiesmeyer survey (from Kayin and Kachin States, Myanmar)

c. Migrants **from China** into **Myanmar**:
   ① Migrants to farms in Shan State of Myanmar n=7

2) Environmental conditions (**quantitative)**

The surveys were based on quantitative measurements followed by analysis of the following items:

1) Air quality related to high-environmental-impact infrastructure and industrial construction projects (major roads, industrial parks, housing estates) and to the over-use of toxic chemicals in new plantation agriculture managed by outside investors / food importers
2) Observation of soil quality (as a follow-up to previous years' baseline measurements

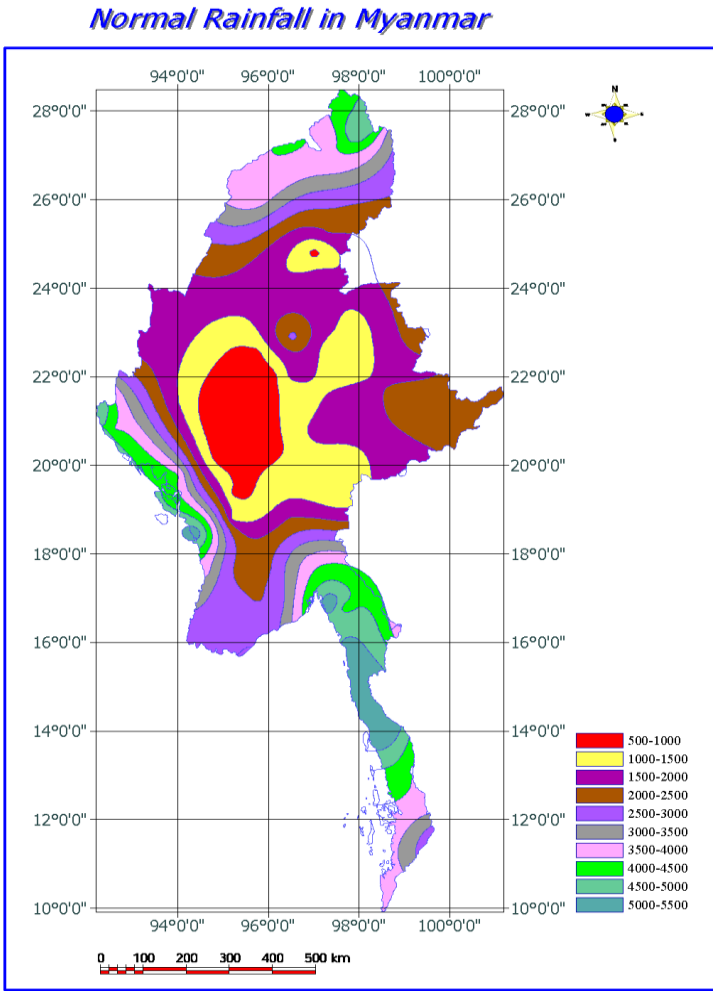
4. Raw data

The environmental findings included both primary (air and soil analysis) and secondary (warming temperature and extreme weather) data. A summary of the qualitative (interview) data is given below

the environmental data.

１）As the map below shows, the current rainfall in Myanmar in the central area, including this research project's survey areas of Mandalay and upper Magway Division, is less than 1,500 mm per year. The areas in yellow below show the areas to which the traditional Dry Zone has expanded. Agriculture and food security are seriously comprised in these areas, in the rural portion of which there are no other jobs or means of providing basic human needs. Residents of these areas often migrate permanently out of the area bringing the entire family with them.

ミャンマー連邦国環境省による雨降(2012 年)



Next, data on air pollution which follows is meant to show the severity of the underlying causes of the pollution, which have also directly impacted the amount and quality of land and soil for cultivation. The main pollution-causing issue under consideration is the rapid increase in non-EPA compliant new construction projects including major highways and major industrial projects.

Although these projects are urgently needed in Myanmar, a non-EPA compliant implementation will end by costing more in terms of remediation, imported food, healthcare expenditures, and labor loss.

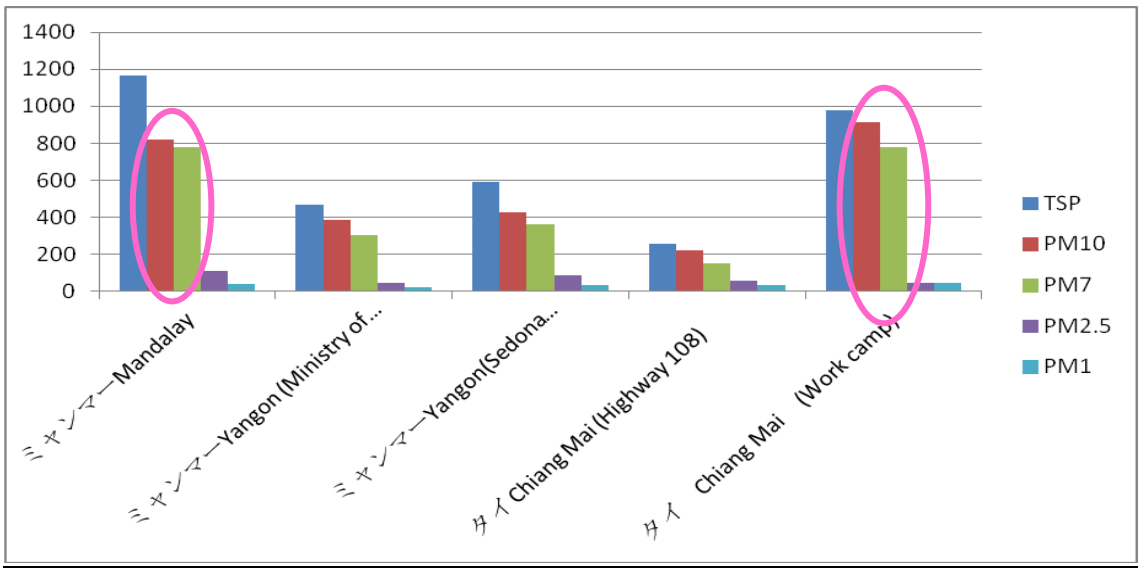
Table 1 Raw data collected by Prof. Lynn Thiesmeyer ティースマイヤが収集した生データ 2013 年 2 月 20 日–28 日

	Feb. 21 18:00	*Feb.22 16:34*	*Feb.22 17:53*	*Feb. 26 12:50*	*Feb..28 12:27*
	Mandalay	*Yangon (Ministry of Industry I)*	*Yangon(Sedona Hotel)*	*Chiang Mai Highway 108*	*Chiang Mai(Work camp)*
	(Moving)	*1.3m*	*1.2m*	*2m*	
TSP	*1165*	*470.9*	*590.7*	*257.2*	*976.5*
PM10	*820.8*	*386.3*	*426.5*	*220.4*	*911.9*
PM7	*778.7*	*305.7*	*362.3*	*154.5*	*778.6*
PM2.5	*112.3*	*44.8*	*86.8*	*58.3*	*47.6*
PM1	*40*	*24.3*	*34.3*	*34.3*	*46.4*

Table 2　分析 1（東海大学関根嘉香教授分析）：
Converted air concentrations (μg/m3) using the calibrated K value.

	Mandalay	Yangon (Ministry of Industry I)ヤンゴン市内西	Yangon(Sedona Hotel) ヤンゴン市内北	Chiang Mai Highway 108	Chiang Mai (Work camp)
TSP	1165	471	591	257	977
PM10	821	386	427	220	912
PM7	779	306	362	155	779
PM2.5	112	45	87	58	48
PM1	40	24	34	34	46

Bar Graph: Relative values of all locations (air pollution)　（東海大学関根嘉香教授分析）：



The circled bars above represent the high values of large particle matter in 2 locations, Mandalay in Myanmar and a construction work camp in Chiang Mai, Thailand. The high value in Mandalay is due to the large number of both public and private construction projects per year, mainly financed by outside investors. Manufacturing projects with non-EPA compliant emissions in Myanmar, and new housing estate construction in Thailand, are the likely culprits.

Table 3 Percentages of each size-fractioned particles(東海大学関根嘉香教授作成)

	Mandalay	Yangon (Ministry of Industry I)	Yangon(Sedona Hotel)	Chiang Mai (Highway 108)	Chiang Mai (Work camp)
TSP	100	100	100	100	100
PM10	70	82	72	86	93
PM7	67	65	61	60	80
PM2.5	10	10	15	**23**	5
PM1	3	5	6	**13**	5

The yellow highlight values above are percentages of coarse particles, showing a high reading for vehicle emissions in the case of Mandalay, and a high reading for construction-related particles in the case of Chiang Mai.

III. Findings and Conclusions

Air quality and warming: the pollution is due both to industrialization and to environmental mismanagement, including deforestation, watershed diversion, and unsustainable farming practices, and it leads to severe food insecurity that causes rural households to migrate away. It coincides with recent high temperature rises in rural Myanmar and rural Thailand of up to 5 degrees Celsius.

During the February to March period of the last 2 years, the air pollution in the central / northern region surrounding Mandalay has rapidly worsened to dangerous levels due to desertification from the Dry Zone spreading northwards. The unsustainable air quality is outside the scope of this research, but it is a symptom of the global and local decisions that caused it and therefore caused the loss of livelihood- and food-producing environments and the resultant climate-change migration. The desertification and industrialization of the greater Mandalay area has removed large areas of land access from food-producing agriculture. Not only has this impacted the Myanmar economy in terms of sudden and huge rises in food prices and of making it necessary to look for food imports. It has also impacted the labor force and other aspects of the environment, such as water availability and water quality.

In terms of the labor force and economic development there are two issues of significance.

The first one involves the stage of economic development in which Myanmar finds itself. Agricultural production is not only for market and for export, but also, importantly, for the rural dwellers' own consumption. Without it there would be enormous local and regional shortages of basic food.

1) The inability of farm workers to continue farming. Many farms are smallholder plots which are intended only to produce enough for the household's own consumption. With rapid environmental degradation there is not enough soil fertility and irrigation for these food sources to survive. Thus their households and communities will not survive if they stay on. Their remaining choice is to have several of their household members, or all of them, move away. A large number move domestically to cities where they hope to find the kinds of employment that are available to them as illiterate or semi-literate, unskilled labor. Often the younger generation of the family (those between the ages of 12 to 20) undertake this urban migration. In addition, there is also migration to the industrial parks in Hlaing Thayar outside Yangon where unskilled, low-wage labor jobs are available, and more recently to low-wage work at the new Export Processing Zones in the international ports that are currently under construction (Thirawa Port and others). In this survey, 16 young men aged from 14 to 29 had moved from Magway Division in the extreme Dry Zone to unskilled work in Yangon. All mentioned that due to rapid warming and drying of the soil there was no longer enough food or work for all their household members. Earlier, some informants from Pathein in the Delta area who had lost their entire farmland to Nargis Cyclone in 2008 mentioned that they had sent family members to seek work elsewhere. Further, an M2 student's survey found that respondent households from the worst-impacted areas of the cyclone, Labutta and Bogalay, had sent family members to seek paid work at the industrial park at Hlaing Thayar as well as to the new EPZ at the port.
2) Another group moves across borders, normally to the neighboring areas of China or Thailand. In this survey, 2 persons from farm areas leased and managed by Chinese firms and now environmentally degraded, had gone to China. ( ) persons from an M2 student's survey had migrated from Magway Division (Dry Zone) to China, again because the environment in terms of temperature, lack of rainfall and irrigation, and desertification had destroyed their food supply and their farm work.

Other persons, from Kachin State (northern Myanmar) and from Shan State (eastern Myanmar), had moved into Thailand for a variety of reasons. Among these the loss of access to land and of access to their food products (crops and livestock) had been their primary reason to move. In many cases this was seen by the migrants as politically motivated, that is, they had come into contact with military who confiscated land, food and livestock and ordered them to abandon

their villages.

The situation of the Kachin (6 persons, interviewed in November 2012) after arriving in Thailand, however, was similar to their situation in Myanmar in some ways. Not having citizenship, they still had no legal right to access land, and were therefore in an insecure, unpredictable situation as far as obtaining food, earning cash income from crops, or obtaining other possible benefits such as health care, access to higher education, or using land as collateral for loans and investment. They were dependent on neighboring landowners to give them occasional, seasonal work.

3) Migrants within Thailand

a. The environmentally-impacted migrants within Thailand were persons from Myanmar. From Shan State there were migrants who had lost their land through government actions similar to those mentioned for domestic migrants, above. From Kayah State (an ethnic subgroup of Karen), there was 1 informant interviewed in February 2013 who had experienced alternating flooding and drought so severe that he brought his wife and newborn child to a construction site's work camp inside Thailand. From Kachin State in remote northern Myanmar, a distance of nearly 800 kilometers overland to Thailand, the research included interviews with 6 migrants. All had lost land or lost access to land due to government land transfers or military intervention. Their only skill and livelihood is farming, necessitating their migration to look for other areas where farm work was available.

4) Types of migration / Environmentally-related reasons for migrating among all the interviewed respondents are given below. They are ranked according to the frequency of response with 1 representing the most frequent responses. Note that many respondents gave more than one reason for migrating, and some also added reasons that were not specifically related to the natural environment.

1. Due to unsustainable environment / severe environmental change
2. Due to loss of livelihood related to agricultural environment
3. Due to policies for land confiscation and coercion over land or farm products
4. Due to natural disasters having destroyed homes, villages, farmland
5. Due to lack of livelihood opportunities generally

Another one of the findings confirmed that for the agricultural environment on mainland Southeast Asia, the cost of low-toxicity, safer agricultural chemicals is higher than what rural dwellers can afford, making high-toxicity hazardous chemicals their choice or the choice promoted by the foreign

lessors and managers of plantations. As these chemicals quickly degrade the soil into sand, however, they rapidly make agriculture impossible. Ironically some of the destitute Southeast Asian migrants forced to leave home due to environmental degradation find jobs working in small chemical factories across the border in China, or transporting such chemicals back into their own countries for sale. As the Chinese sector analysis by KMPG pointed out,

> The Chinese government will try to rationalise the manufacture of key products like nitrogen fertilizers, agricultural chemicals, chloro-alkaline, sodium carbonate, calcium carbide and vehicle tires. At present, these products are highly concentrated with only six companies generating annual sales revenue of RMB 100 billion. The government plans to allow at least 10 large companies to operate in this segment. (KMPG p. 11)

One conclusion to be drawn from this is that some Chinese authorities may be using climate change as a reason to produce and use more agricultural chemicals, whereas the increased inputs of chemicals themselves are one of the causes of climate change.

Including the Upper GMS area of China's Yunnan Province, the region's dwindling food supply and increasing food demand has resulted in an increase in chemical inputs to agricultural areas. Further, the approaching integration of the ASEAN Economic Community, with its (for China) almost impossibly high standards for the environment and for labor and wages, in 2015 means that it is possible for this sector to fall into the trap of needing to extract and produce more hazardous, cheaper chemicals. At the same time, the rapid inflation and rise in commodity prices in ASEAN countries since 2012 means that local farmers in the region will not be able to avoid buying and using the cheaper, more toxic inputs. As a result, the environment that makes livelihood possible – the soil, watershed, air, and food, as well as the health and life expectancy of the farming population – is facing a rapid decline.

ＩＶ．意義　・成果・今後の展望

The possible significance of the present research is twofold. One potential lies in the correlation and possible causality between severe, often anthropogenic, environmental degradation and the rural food-producers who must then leave the area, sometimes permanently. The second potential lies in the ability of this data, if enhanced and followed up, to show connections among environmental stressors that include agricultural chemicals, industrial emissions, vehicle emissions, deforestation, and watershed loss. These stressors in particular are man-made and thus can be reversed through human decision-making and policy reform.

The number of migrants giving climate and environment as a reason for migration seems positioned to rise, as do the indicators for heavily climate-change-impacted developing countries in Asia. A more thorough survey of these migrants and of the environmental conditions in their places of origin would be able to show more reliable correlations among environmental stresses, their

outcomes in climate and environmental change, and the results in food insecurity and human decisions to move. As these environmental and climate concerns, as well as migration itself, are not confined to single countries, the significance should extend to Japan and globally as well.

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