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Post-Disaster Recovery: A Comparative Case Study in Ayeyarwady Region, Myanmar and Fukushima Prefecture, Japan

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Abstract

The cyclone Nargis devastated the Ayeyarwady delta area of Myanmar on May 2, 2008. Although the government agencies, local and international NGOs and donors provided support, economy still remained depressed and livelihood security was far from stabilities. In 2013, about five years after the Nargis, the incidences of poverty, landlessness and out-migration were significantly high. Most vulnerable households were often lack of income sources, social and safety network systems. The cyclone disaster severely damaged the community's immune system and its ability to recover on its own, making it more vulnerable to the negative effects of subsequent events. The amount of aid was an important factor for shaping recovery, even though the resources provided were far below the estimated losses and damages. As a comparison of the impacts of a natural disaster, a brief study was conducted on the severe nuclear accident at the Fukushima nuclear power plant. It was triggered by a massive earthquake and subsequent tsunami which hit the Japanese coast on March 11, 2011. The investigation commission's report concluded that it was a manmade disaster – that could and should have been foreseen and prevented. The lessons learned will help the world to prevent nuclear accidents elsewhere. It recommended that the priority should be on human safety, rather than the structural safety of nuclear reactors; and that earthquakes and tsunami are still unpredictable but unavoidable events. Impacts of the natural disaster of cyclone Nargis and poverty, as seen in Myanmar, damaged physically as well as psychologically to the local people and livelihoods. The wellbeing of these cyclone victims are largely neglected and the recovery is still far from reality. Similarly, after the tsunami disaster, as in Japan, the affected people are still living in the evacuation centers, suffering from the impacts of the nuclear leakage. Taking lessons from the failure of Fukushima power plant, we should prepare how we respond to these risks and uncertainties, when Myanmar applies the nuclear energy as an option of a power solution.

Keywords: cyclone Nargis, nuclear disaster, tsunami, livelihoods, out-migration

1. Cyclone Nargis in Ayeyarwady delta

The Ayeyarwaddy delta situated in the south of Myanmar has been known as the rice bowl of Myanmar. It covers 34,158 square kilometers of alluvial plains where the Ayeyarwady River divides into numerous tributaries flowing into the Andaman Sea. Favorable agro-climatic condition and soil fertility make this region comparatively advantageous to the large production of rice, pulses, oil crops, and maize. However, due to its geographical nature, the delta region is frequently affected by severe floods and storms. With a high population density, 72% of delta households were landless in 2011. On 2–3 May, 2008 Myanmar experienced the most devastating natural disaster in its history, Cyclone Nargis, which severely swept Ayeyarwady and Yangon Regions. With heavy rains and winds reaching over 200 km / h, 140, 000 people perished and about 800,000 people were displaced. The floods submerged more than 783,000 hectares of rice fields; many were damaged by intrusion of sea water and sand. Over 85% of rice seeds were lost and 50% of draft animals (about 300,000 cattle) died in the affected area. Beside the village infrastructure were largely destroyed, communities lost their production assets, such as tools, seeds, fishing boats, nets, livestock and etc. It seriously affected the production and other businesses, and brought down the economy of the affected areas. The landless population were the hardest hit, whose employment mainly depended on agriculture, fisheries, and forest resources in the delta.

1.1 Survey study visit

Survey study visits were conducted in several villages of cyclone affected areas in Bogalay and Pyarpon Townships in 2012 and 2013. The team interviewed with farmers as well as with focus groups at community level and key informants from various stakeholders for the better understanding of their livelihood in the current conditions of post –Nargis recovery. Available secondary data and previous reports were also reviewed. Moreover, a field survey was conducted in 2015 in several villages of Pyarpon Township, where the severe salinity problem in rice production became prominent after Nargis. The data collection were emphasized on current socio-economic condition, livelihood problems, climatic variability, farmers' strategy and etc.

1.2 Post-Nargis early recovery

The first impact in the aftermath of the cyclone was food insecurity for their survival – the victims who survived after the disaster in the highly affected areas had nothing left to eat. They were totally dependent on the donations and aids. Villagers used to rely on private money lenders, relatives and traders, as their credit sources, who could not work well any longer. They were unable to repay their loans incurred before Nargis, and could not get new loans, either. The lack of investment

led to the reduction of inputs for their business and they fell in the viscous cycle of poverty. Secondly, workforce for farming was difficult to recruit because of the high mortality caused by the cyclone. It also damaged rice seed stocks so that farmers had to use poor quality seeds due to a mixture of different varieties to get the required amount. The impurity of seeds gave fewer yields with poor quality product. Occurrences of disease and pests increased than ever before, with an outbreak of rodents recorded in 2009. Thirdly, fishery sector was severely damaged. Numerous fishes were killed during the cyclone and the damage of mangrove trees caused the loss of habitats and breeding grounds of fishes. Fishermen lost their fishing tools such as boats, nets and etc. All resulted in a significant fish catch decline, leading to the food insecurity of many people in the cyclone affected areas.

After the Cyclone Nargis, LIFT (Livelihood and Food Security Trust Fund) started the first developmental effort offering humanitarian assistance in those affected areas. The delta region received the overall support of about \$200 million from various agencies with LIFT's contribution at \$19.5 million for 22 one-year projects in 2010 (Delta 1). Another \$18 million has been spent on nine three-year projects that started in 2011 as Delta 2 Program. The activities with prominent impacts to the community were: mangrove plantations, training and assets, Pact loans, revolving funds, agriculture support services, and etc. Self-help Group (SHGs), rice banks, vocational trainings and the training to community extension workers (CEWs) also showed effective. Government agencies, various INGOs and NGOs, UN organizations, various donor agencies, and private sector and state agencies actively contributed their assistance as humanitarian relief to the victims in cyclone affected areas. For food security of the victims, quick income, such as "cash for work" and cash grants were supported. To enhance agricultural production, the provisions were targeted to the agricultural inputs (seeds, fertilizers and pesticides), buffalos, and farm machineries (power tillers and field equipment). In-kind support, as well as cash based approach, and construction of infrastructure and public services were found to be largely benefited to the quick restoration and rehabilitation of affected livelihoods in the early recovery stage.

The largest portion of post-Nargis aid was provided within the first year of the cyclone. The initial aids from local and civil societies were highly beneficial to the affected villages in the aftermath of the cyclone. However, it was noted that aids were not always targeted to the needs of the disaster-affected populations. Aid providers made aid related decisions and aid distribution were formalized through official leaders and village emergency committees. Communities were not involved in decision making, creating perceptions of misuse and conflicts. These tensions weakened the social relations, negatively affected relations between villagers, and villagers and their leaders. The goods that donors provided did not always match with the villagers' own priorities. A few donors provided cash assistance which

could empower the survivors. Although the victims preferred the cash -aid which was more effective to them, the political situation at that time prohibited the provision of cash on a larger scale.

1.3 Post-Nargis late recovery

The TCG (Tripartite Core Group) developed a comprehensive monitoring system and three Post-Nargis Social Impacts Monitoring (SIM) were carried out during the post-disaster recovery period from 2008 – 2010. The reports provided the information on how village life was changing and how aid responses could best help the affected communities. The fourth, SIM 4 was conducted in 2013 involving in-depth qualitative interviews, focus group discussions, and key informant interviews with 895 villagers in 40 villages in the 8 townships, most of them were affected by the cyclone in the delta. The classification of study villages was based on the level of losses of livelihood assets: lightly/not affected villages (level of damage to housing and infrastructure very low or no damage); moderately affected villages (almost every house slightly damaged but only a few washed away, schools, roads, bridges damaged but to a milder degree); and highly affected villages (almost every house and the assets they contained washed away and important community infrastructure destroyed). It was recorded that all villages with a low level of damage had no or few deaths while all villages with a high death toll experienced a high level of damage. An exception was recorded in 14 sample villages where no or few deaths occurred but they had moderate levels of damage.

According to the reports, five years after the cyclone, in 2013, villages were seen still in a desperate economic situation. This situation was not only attributed to the Cyclone Nargis, but also other factors influenced the path of recovery in subsequent years, such as climatic variability – storms, floods, droughts; crab and rat infestations; low farm gate price of paddy and other crops, and etc. The cyclone destroyed most parts of embankments, exposing the fields more vulnerable to flooding; the duration and intensity of tides became longer and stronger, inducing the fields more saline condition and poor production. With few funds available for the repair and renovation of embankments and dykes under the post-Nargis aid program, the farmlands were not protected from flooding and sea water intrusion. Nargis had affected livelihoods to such a degree that many villages appeared to have lost their ability to self-recover on their own. The highly cyclone hit areas were found to be more vulnerable to the harmful subsequent events, which significantly hindered their recovery process. In 2013 most of the 40 sample villages were still struggling and far behind to recover socioeconomically. It was noted that none of the highly affected villages were in good economic standing. Post-disaster aid ended by 2010. Although aids were greatly helpful to beneficiaries,

aid levels dropped sharply and were too low to enable cyclone survivors to adequately recover their livelihoods.

1.4 Farming and fishery sectors

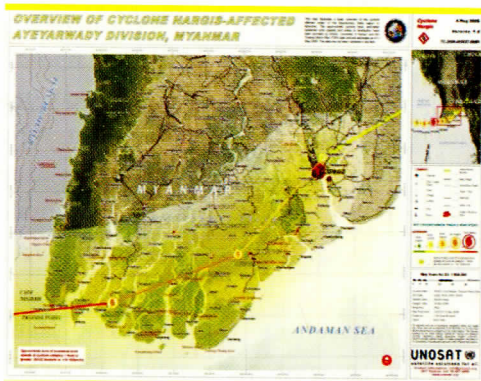
The recovery in farming appeared to be a short-lived. All the survey studies showed that rice yields remained below the pre-Nargis levels in all sample villages. The decline of fish stocks due to the cyclone was compounded by overfishing of commercial fishery. Fishing license fees were largely raised than before Nargis and commercial fishermen were allowed to fish year-round, resulting in unsustainability in fishery sector. The distressed economic condition strongly affected livelihood of laborers. The inability of large holder farmers to recover their livelihood and cultivate their land as intensely as before further reduced job opportunities for casual labor. Furthermore, many small farmers and fishermen became laborers. During 2010 – 2013, 20 – 50 % of medium and small farmers became laborers in about half of the villages with poor farming conditions. This also led to the highest number of land transactions, and small farmers lost their lands. These conditions enforced the young locals, man and women alike, to pursue the out-migration: rural –urban migration, as well as migration to abroad. Out-migration generally increased in all sample villages. Two-thirds or more of the households in 40% of the sample villages had at least one family member who migrated. In some villages, nearly half of village's youth migrated to big cities for a better life.

As a formal program the Myanmar Agriculture Development Bank (MADB) provided seasonal loans which hardly covered the amount of credit requirement. Most farmers relied on expensive informal credit sources with high interest rate. Pact global microfinance fund (Pact, Myanmar) has been providing credits in its project areas. Collective funds and Village Development Committee (VDC) funds were growing in many villages, some of which were well functioning. Mid-term Review team (MTR) reported that farmer access to savings and credit services had improved, but it remained difficult for poor households to manage their seasonal cash flow and expenditures. It was noted that small and medium farmers in 75% of the sample villages reduced investment of fertilizer and other farming inputs. These circumstances depressed input use, reduced production and farmers' incomes, and ultimately increased their indebtedness.

1.5 Infrastructure development and social relations

The most prominent infrastructure support was placed for housing, education, and water and sanitation. Generally, the village infrastructure in the sample villages was of a better quality than prior to the cyclone. Moreover, aid from organizations, private donors, and the government helped improve the transportation infrastructure. The villagers in the majority of villages were content

with overall condition and convenience of transportation infrastructure, better than before Nargis. In over 80 % of the villages, new school buildings were constructed or existing buildings were repaired. Five villages had neither schools nor health facilities. Over two-thirds of villages had no health facilities, since the aids were not mainly targeted to this issue. Some village community established social protection funds, and implemented social protection initiatives, including food for families with no food security (free food and food on credit), emergency health fund for vulnerable people, and livelihoods protection for the poor and poorest of the poor. Effective social protection measures provided for the poorest and most food insecure households (particularly through cash-for-work) were observed only in limited project areas. Social relations were considered good or fair in most villages.



The path of Cyclone Nargis on May 2-3, 2008



A devastated village in the aftermath of after Nargis



Cattle in shipment from other regions to affected delta areas



A School –cum Shelter in Tepin Seik village

In villages where social relations were good, the community was organized and villagers undertook collective activities, such as socio-religious tasks, road renovation and pond cleaning, etc. However, many villagers felt that relations were worse than before Nargis because the socioeconomic challenges had a negative impact on social cohesion among villagers.

Multiple factors determine recovery; they were cross-cutting issues, such as governance and social accountability; community perceptions, aid effectiveness, vulnerability, and social exclusion and etc. Other factors critical to recovery included the degree of affectedness (measured by the damage suffered rather than the death toll); the quality of formal and informal leadership; the frequency and severity of subsequent external events; and the way in which aid was delivered.

2. Earth quake and tsunami in Fukushima Prefecture

On 11th March, 2011, a 9.0 magnitude earthquake took place 231 miles northeast of Tokyo, which caused a tsunami with 30-foot waves. This massive earthquake and subsequent tsunami hit the Japanese coast, with a death toll of 15,893 people, sweeping away vehicles, causing buildings to collapse, and severing roads and highways. Most unfortunately, it triggered an extremely severe nuclear accident at the Fukushima Daiichi Nuclear Power Plant, which was situated in the affected area. The tsunami flooded and totally destroyed the emergency diesel generators, and damaged the power supply to cool down the reactors. Series of events occurred by the severe accident ultimately emitted an enormous amount of radioactive material into the environment. This devastating accident was declared a Level 7 (Severe accident), the highest level, signifying a major accident, which amounts to a major release of radioactive material with widespread health and environmental effects. People living within 20 kilometers of the power plant, a total of about 185,000, were evacuated. In November 2011, Japanese authorities announced that they had halted the shipment of rice from some farms northwest of the Fukushima nuclear power plant after finding higher-than-allowed levels of radioactive cesium. All 50 of the country's reactors were shut down in September, 2013 for maintenance, leaving the country with no nuclear power supply.

2.1 A study visit

A study visit was made on 15th November, 2013 to the Tsunami affected areas in Fukushima Prefecture, namely, Minami Soma, Odaka, Namie and Itate Towns. It was observed that radiation readings rose steadily when we approached to the core zones from the periphery areas (ranging from 0.09 to 6.64 microsieverts). Standing in the middle of a deserted street of a deserted town gave us a "very strange feeling". In the silence and emptiness, surrounded by the slowly decaying familiarities of modern Japanese life, there was a feeling of loss, abandonment and

in despair. We witnessed the real situation of miserable deserted areas, a few workers wearing protective suits and masks gathering the soils and debris for clearing up of possible radiation-contaminated soils. The locals were permitted to enter only in the day time to the un-inhabited areas of the off- limited zone. Some former residents were seen looking at their belongings, sitting or walking around in their familiar areas. It clearly manifested an unsettling unreal of normalcy amidst the ruin.

2.2 Causes of the disaster

The Fukushima Nuclear Accident Independent Investigation Commission reported that it was a “manmade” disaster – that could and should have been foreseen and prevented, and its effects could have been mitigated by a more effective human response. The power plant accident was the result of collusion between the government, the regulators and TEPCO (Tokyo Electric Power Company), and the lack of governance by said parties. The construction of the Fukushima Daiichi Plant that began in 1967 was based on the seismological knowledge at that time. It was incapable of withstanding the earthquake and tsunami that hit on that day. All responsible authorities concerned failed to correctly develop the most basic safety requirements, such as assessing the probability of damage, preparing for containing collateral damage, and developing evacuation plans for the public in the case of a serious radiation release. As they had firmly committed themselves to the idea that nuclear power plants were safe, they were reluctant to actively create new regulations. The situation continued to deteriorate because the crisis management system did not function correctly for the emergency response issues.

2.3 Evacuation issues

Due to its drastic escalation and the radiation leakage, evacuation destinations and other evacuation details were often revised. Each time the evacuation zone expanded, the residents were required to relocate. Unaware of the severity of the accident, they planned to be away only for a few days and evacuated with only the barest necessities. Some residents were evacuated to high dosage areas because radiation monitoring information was not provided. Insufficient evacuation planning led to many residents receiving unnecessary radiation exposure. Others were forced to move multiple times, resulting in increased stress and health risks—including deaths among seriously ill patients. The Commission verified that there was a lag in upgrading nuclear emergency preparedness and complex disaster countermeasures, which attributed to the regulators’ negative attitudes toward revising and improving existing emergency plans.

2.4 Public health and welfare issues

The residents in the affected area were still facing grave concerns, including the health effects of radiation exposure, displacement, the dissolution of families, disruption of their lives and lifestyles and the contamination of vast areas of the environment. An estimated 167 workers were exposed to more than 100 millisieverts of radiation while dealing with the accident. It was estimated that as much as 1,800 square kilometers of land in Fukushima Prefecture had been contaminated by a cumulative radiation dose of 5 millisieverts or higher per year. One of the biggest concerns among residents was the current and future health damage from radiation. They did not understand well regarding radiation doses in their neighborhood, its impact on their health, and the risk of radiation exposure. Moreover, people were suffering from mental health issues, which evolved into a serious social problem among those affected by accident.

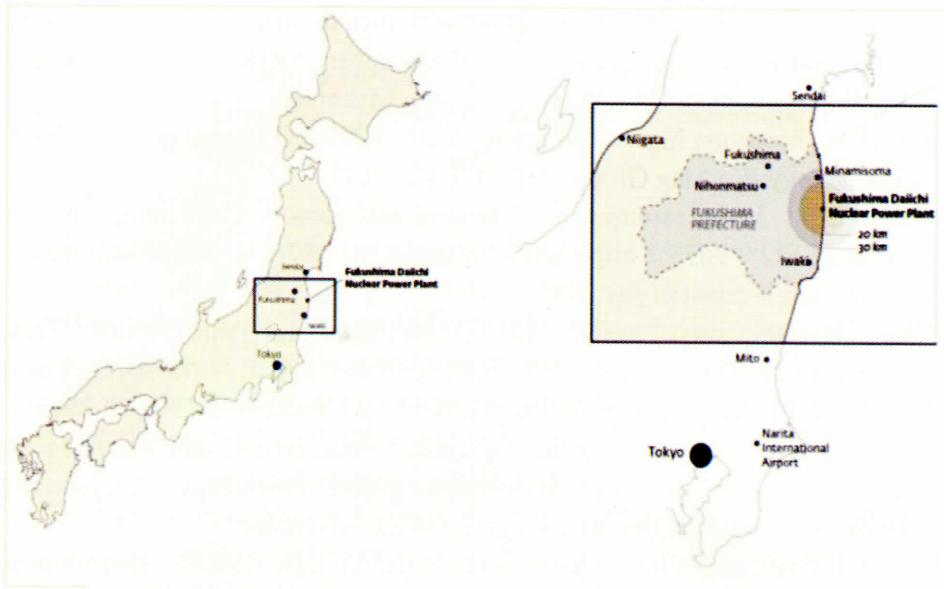
For almost five years, the evacuee had been living in crappy houses or apartments which were not convenient for them. In November, 2015, the authorities were beginning to let people move back home if they want. Life showed a mix of desire and fear. The displaced people could not make decision yet between a desire to return and a fear of what remains. Although radiation finally returned to normal levels, still they had to face the physical degradation of their homes and livelihoods. The city stayed empty for five years and they started rebuilding their lives somewhere else. For many people, years after their lives were so abruptly interrupted, all that remains in the aftermath of Japan's worst nuclear disaster are the memories of a life left behind.

3. General conclusion

The recovery from Cyclone Nargis disaster was a lengthy and complex process. It pointed out that the capacity of the survivors to recover depended on how much intensity they were affected. Without sufficient aid, as was the case in Ayeyarwady delta after Nargis, highly affected communities lost their capacity to self-recover and unable to withstand the subsequent harmful events. Moreover, the post-disaster aid was rarely sufficient for recovery and far below the estimated losses and damages. A more comprehensive understanding of the local people could have guided the aid providers to invest more in areas of their sustainable livelihood. To understand the impacts of how the post-disaster aids, leadership, and institutions on the physical and social structures of affected communities are of vital for ensuring that the aid effort fits well with local realities and contribute more effectively. Besides, the long-term effects of the disaster on their livelihoods and post-Nargis recovery are not well understood and largely neglected these days. Aid to the delta was no longer seen in a post-disaster context, even though the socioeconomic situation in highly affected areas were still definitely in need of

recovery assistance. The Fukushima disaster in Japan was taken as a brief comparative study. Japan is a well-known nation that takes a great pride in its global reputation for excellence in engineering and technology. How such an accident could occur in Japan, and the lessons learned will help the world to prevent nuclear accidents elsewhere. Among others, the following facts were noted: the priority should be placed on human safety, rather than the structural safety of nuclear reactors; the understanding that earthquakes and tsunami are still unpredictable but unavoidable events. Presently, energy security is of grave concern in Southeast Asian nations, including Myanmar. In spite of the Fukushima disaster, all are increasingly turning to nuclear power as a viable non-emitting source of electricity. If Myanmar considers the nuclear power a part of the solution, great concerns must be taken, such as what the risks are, who will be affected, and what the preventive and countermeasures, and how we respond to the possible risks and uncertainties. The right of safeguards, institutional arrangements and governance structures must be in place to ensure the highest level of safety and accountability. Taking the lessons from the failure of Fukushima disaster, we should put more emphasis on the negative impacts of “technology development” on the people and their livelihoods, as well as on environment.

Impacts of the Cyclone Nargis and poverty in Myanmar, a developing nation, damaged physically as well as psychologically to the local people and livelihoods. The wellbeing of these cyclone victims have been largely neglected and the recovery is still far from reality. Similarly, after the five years of tsunami in Japan, a developed country, the affected people are still living in the evacuation centers, suffering from the impacts of the nuclear disaster.



**Fukushima Daiichi Power Plant disaster on March 11,
2011 by the earthquake and tsunami**



**Fukushima Daiichi Power Plant
damaged by earthquake and**



A deserted town in the aftermath of tsunami



A residence left in a deserted town



**Workers gathering contaminated soils in an
affected area**

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