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SUMMARY OF DOCTORAL THESIS

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Title: Analyses of Socio-economic Status and Livelihood Patterns of Coastal Communities
Dependent on Mangrove Forest Resources in Guinea

(ギニアにおけるマングローブ林資源に依存した海岸コミュニティの社会経済的地位や生活パターンの分析)

In Guinea, coastal lands play a key role in national food security in terms of agricultural production focused on mangrove rice cultivation and sustainable management of natural resources. Over one-third of the country's population lives in coastal lands. In developing countries like Guinea, the population relies on the natural resources for their livelihood. In Guinea, ecosystem degradation results primarily from economic activities including agriculture and logging for firewood.

The main objective of this study consists to analyze the socio-economic status and livelihood patterns of coastal communities dependent on mangrove forest resources in Guinea. The reason behind focusing to such analysis is based on the improvement of the socio-economic status of livelihood coastal communities in Guinea, suggesting sustainable management of mangrove forest resources, providing sustainable balance approach between coastal communities and coastal forest management.

From my viewpoint, there are no studies in Guinea yet conducted by integrating the socio-economic aspects and spatial analysis to identify the dynamics of mangrove forest resources affected by livelihood activities practiced by the coastal communities. In the same line, there is no study yet interested in the performance in terms of the technical efficiency of small-scale mangrove rice farmers and salt producers in Guinea. I managed also to detect complex scenarios that are leading to the degradation of coastal forests in Guinea. To my knowledge, this study is the pioneer in these areas in the Guinean context. In sum, the study comes up to diagnose the determinants of livelihood activities (mangrove rice cultivation, salt production and wood extraction) and suggest improvement of socio-economic status of coastal communities and sustainable management of mangrove forest resources.

This study is based on primary and secondary data. The primary data was conducted through field survey using structured questionnaires, GPS data collection, group discussions and field observation guided by key persons from the study sites. The secondary data was collected via remote sensing data, literature review based on published and unpublished studies. The study was conducted in Dubreka and Boffa prefectures, in the Maritime Guinea region, from March to April 2011 and 2013, where 260 peasants were surveyed. These prefectures represent the most potential zones among others in terms of mangrove rice production, salt production and mangrove wood extraction.

Mainly, the study applied three types of analytical methods. These methods are descriptive statistics, empirical analyses and spatial analysis. Descriptive statistics were used to describe the characteristics of surveyed peasants and different livelihood patterns. Empirical analyses refer to the Gini decomposition for measuring the income inequalities regarding the portfolio of livelihood patterns of peasants; the Foster-Greene-Thorbecke (FGT) poverty index for assessing the degree of poverty; the multiple linear regression, quantile regression and binary logistic regression were used to assess factors influencing the mangrove rice production, salt production and farmer's contribution to the land use transitions, respectively; the stochastic frontier

production function measured the technical efficiencies of both salt production and mangrove rice farming. Finally, spatial analysis refers to the post-classification comparison for producing a complete matrix of land use change directions.

The results revealed that: (1) the spatial analysis revealed that about 41.7% of the 5,099 hectares of landscape has undergone changes. The binary logistic regression results indicated that yield and membership in farmer's organizations as two important determinants of land use change. (2) The main purpose of the mangrove farming in the study area remains for the self-consumption. Thus, findings from the multiple regression analysis revealed that the cultivated area, off-farm income per family members, agrochemical, farmers' opinion on the type of irrigation systems, improved seed variety usage and combination of both local and improved rice varieties as factors determining the mangrove rice productivity in the study area. (3) The study shows that salt producers under the improved techniques have more access to convenient household assets and better housing. An improved living condition could limit the deforestation of mangrove and upland forests. The adoption of the improved salt production techniques resulted in the minimization of the total variable cost related to the salt production which led to higher profits. (4) Loss due to the inefficiency was enormously significant (8,838,762 Guinean Francs per acre) for the whole season of mangrove rice production. Results also highlighted the fact that even the best salt producers were inefficient. In addition, the estimation of the loss due to the inefficiency occurring seasonally was significant and valued at 601,024 Guinean francs per basin. (5) The salt production and vegetable production give rise to income inequality. Therefore, by enhancing the share of income from mangrove rice production, wood extraction, non-farm income, livestock, seasonal crop production, lowland rice production, remittance and perennial crop production has the potentials to reduce income disparity among the peasants. Poverty measures also revealed that the degree of poverty reduction largely depends on the extent to which livelihood activities of the peasants can be diversified. (6) The peasants were found heavily relying on the traditional cooking devices which may impact negatively on forest degradations and peasants' health. The study also presented three scenarios leading to the degradation of both mangrove and upland forests threatened by the unsustainable household energy consumption and the livelihood activities (salt production, wood extraction and mangrove rice production) practiced in the coastal area of Guinea.

Policy implications are advocated based on the findings. The three most important policy implications for mitigating rapid land use change in the Guinean coastal belt are: (a) pressing need to improve mangrove rice productivity, (b) the need to strengthen and maintain strong dikes to prevent sea water intrusion into the rice fields, and (c) the need to strengthen the farmers' organizations to enhance farmer participation. The findings advocate strategies such as encouraging producers' participation in activities organized by local and/or international NGOs for the purpose of sharing knowledge and experience of salt producers. It also suggests coating of basins or ponds for limiting the significant loss of salt occurring seasonally.

The government is required to facilitate the public investment in physical infrastructure (irrigation including embankments, dikes, etc.) which is crucial for improving mangrove rice farmers' efficiency, and then, earnings. Policy makers and different actors involved in the Guinean coastal area are requested to take further efforts to rectify income inequality and poverty alleviation through the provision of extension programs and credit services to rural areas until improved access to market opportunities created a demand for technology and inputs. These recommendations will pave the way to improve rural livelihoods and conserve natural resources and biodiversity.

The negative impact of traditional salt production (TSP) techniques on the mangrove and upland forests could be mitigated through producers' motivation for the adoption of improved salt production (ISP) techniques. Hence, the adoption of ISP techniques could enhance the livelihood improvement and contribute to the sustainability of both mangrove and upland forests.