IMPACT OF TIDAL INUNDATION ON RICE CROP AND ADAPTATION STRATEGIES IN COASTAL AREA OF CAMBODIA

A CASE STUDY IN PREAEK TNAOT COMMUNE, TEAK CHHU DISTRICT, KAMPOT PROVINCE, CAMBODIA

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ABSTRACT

Tidal Inundation (TI) is a major problem that contributes to restricting rice cultivation along coastal area. Rice crop areas along the coast of Cambodia have already affected by TI. Associated with this issue, only a few studies have been done, and they have found that rice crop along the coastal area of Cambodia seems to be more affected by TI. However, little currently available data estimating social and economic impacts of TI on rice crop in coastal area of Cambodia. Moreover, some local communities have no strategies to implement yet, and other areas have found some solutions but it's ineffective because of continuously occurring problems. Thus it is necessary to have an appraisal of the present rice crop's exposure to TI and propose effective solution to deal with this issue in Cambodia. This study explored current issues of rice crop due to TI and proposed effective and suitable adaptation measures to reduce the problems. This research results complement an efforts of assessing coastal rice crop threats causing by TI, and this helps NGOs, government, and other relevant institutions develop the effective measures and management planning to deal with TI issues in coastal area of Cambodia.

In this study, two villages, Preaek Tnaot and Preaek Kreng, in Cambodian coastal area were selected for case study. Qualitative and quantitative approaches were adopted, and both secondary and primary data were analyzed. Participatory mapping was used to create current

TI Mapping (TIM) by using satellite images, Global Positioning System (GPS), and Participatory Rural Appraisal (PRA) technique. Maps were created and calculated by using ArcGIS and Google earth. Field observations (two times), one Focus Group Discussion (FGD), ten Key Stakeholder Interviews (KSIs), and fifty three household surveys were conducted. Perception model and Chi-Square test were used to analyze farmer characteristics on awareness and response level. Cost-Benefit Analysis (CBA), SWOT analysis, and TOWS matrix were used to evaluate and design effective adaptation strategies.

Based on TIM, the total affected area in both villages due to TI was 287.74 ha that 140.61 ha (48.87%) was current rice fields and 147.13 ha (51.13%) was abandoned area. Associated with these results, compared with total current rice field area both villages (700 ha), rice field and abandoned areas which affected are corresponding to 40.17% and 58.83% of total current rice field area, respectively. Rice yield in affected area was deteriorated compared to rice yield in non-affected area. Rice yield in TI area was 0.21 – 0.92 t/ha/year, while in non-affected area was 2.05 – 2.57 t/ha. As a result, average yield 35.81% – 89.76%/ha/year was lost due to TI. The amount of rice production loss from current rice fields which affected by TI was 245 t/year and potential rice production loss from abandoned area in affected area was 340 t/year that corresponding to 43% and 60% of current rice production, respectively. TI problems in study area are still continuing due to ineffectiveness of current measures. Presently, both coastal villages do not have direct projects on TI issues. Farmers used ineffective ways to deal with problems. Associated with the issues above, three adaptation measures in which dike system construction, introduction of new rice varieties, conversion of rice field to natural mangrove-shrimp pond are effective and appropriate for applying to study area. Dike system construction measure is high effective for protecting rice crop from TI and provides positive economic benefit for target farmers. Dike system can protect affected rice field 114.09 ha that increase rice production 198.52 t/year and provide

more benefits about USD 574.2/ha/year. Dike construction provides high-potential benefits to social and crop development. Introduction of new rice varieties, four kinds of new rice varieties are proposed: (i) combining salt and submergence tolerant varieties can tolerate both salinity and submergence, (ii) combination of salt-tolerant & short duration varieties (≤100 days) can avoid damage and harvest before flooding period, (iii) salt-tolerant rice varieties can adapt to soil salinity, and (iv) high quality & aroma, and early maturing (≤ 100 days) varieties can increase local rice production and farmers' income. Conversion of rice field to natural mangrove-shrimp pond measure is an environmental friendly and appropriate solution. The measure can provide higher profit than abandoned rice fields or keep growing rice crop in affected area. Based on possibility assessment in proposing of all of three measures, dike construction provides clear potential benefit and acceptable to propose in both coastal villages, while other two measures need to conduct pilot test in place to ascertain potential benefits before proposing. Nevertheless, introduction of new rice varieties and natural mangrove-shrimp farming are optimal priority measures to deal with TI problems in study area or coastal area of Cambodia. Therefore, fund supports from government or donors for dike construction operation and experiments and pilot tests of new rice varieties and natural mangrove-shrimp farming measures are essential for successful implementation.

Key words: Dike construction measure, Local rice food insecurity, Perception Model, Tidal inundation mapping, TOWS matrix.