

Development of Climate-Related Risk Maps and Adaptation Plans (Climate Smart MAP) for Rice Production in Vietnam's Mekong River Delta

Working Paper No. 220

CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)

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RESEARCH PROGRAM ON
**Climate Change,
Agriculture and
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Abstract

The El Niño-Southern Oscillation (ENSO) in 2016 adversely affected Vietnam particularly the Mekong River Delta (MRD), where more than 90% of the country's rice export is produced annually. During that time, salinity intrusion and drought significantly affected agriculture production in the area. Furthermore, flooding aggravated by climate change is another recurring event in the area. An assessment conducted by CGIAR Centers showed that even as warnings were provided by the government for the 2016 ENSO, these were not translated into appropriate preparation and response for agriculture. To address this and prepare for future climate risks, the Department of Crop Production (DCP), Ministry of Agriculture and Rural Development (MARD) of Vietnam, and CGIAR Research Program on Climate Change, Agriculture and Food Security in Southeast Asia (CCAFS SEA) collaborated to develop and test climate-related risks maps and adaptation plans (Climate Smart MAP/CS MAP) for recognizing climate-related risks, identifying potentially affected areas and developing regional and provincial adaptation plans for rice production. The CS MAP is a participatory approach involving experts from various local and national offices for: (1) identifying climate-related risks; (2) delineating affected areas and risk levels; (3) proposing corresponding adaptive plans; (4) fine tuning and verifying proposed measures; and (5) developing integrated provincial and regional adaptation plans. Risk maps were developed for normal and ENSO years by using technical data (i.e. topography and hydrology), infrastructures (i.e. dikes, road and canals), and local observations. Changing rice-based cropping systems and sowing/transplanting calendars were common adaptive options proposed by provinces. CS MAP is now being developed at different stages for 13 provinces in the MRD. Some provinces are implementing the adopted measures and developing the corresponding monitoring and reporting tools.

Keywords

Participatory mapping, Climate-Smart MAP, CS MAP, policy, rice production, Vietnam.

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Acronyms

AMO	Agricultural Management Office
CCAFS SEA	CGIAR Research Program on Climate Change, Agriculture and Food Security Southeast Asia
CS MAP	participatory development of climate-related risk maps and adaptive plan or Climate Smart MAP
CLUES	Climate Change Affecting Land Use in the Mekong Delta: Adaptation of Rice-based Cropping Systems
CPO	Crop Production Office
CSA T&P	climate-smart agriculture technologies and practices
DARD	Department of Agriculture and Rural Development
DCP	Department of Crop Production
ENSO	El Niño-Southern Oscillation
HMO	Hydrology Management Office
MONRE	Ministry of Natural Resources and Environment
MRD	Mekong River Delta
NCHMF	National Center for Hydro-Meteorological Forecasting
NGO	non-governmental organization
NHMS	National Hydro-Meteorological Service
SHMC	Southern Hydro-Meteorological Center
SIWRR	Southern Institute of Water Resources Research

A. Introduction

Background/Rationale

Being considered as main rice basket of Vietnam, the Mekong River Delta (MRD) comprises 56% of the total domestic rice production and more than 90% of Vietnam's rice export. Over 1.7 million hectares of land, more than half of the total arable land in the region, are being used for rice production (GSO, 2016). With this significance in the agricultural economy and food security of Vietnam, it is very important that the rice production in the MRD is ready for the challenges of climate change. Severe drought and salinity intrusions have occurred in El Niño years (1997–1998, 2004–2005, 2010, and 2014–2016) (DMC, 2016) and will be more serious in the future under impacts of climate change. The MRD is also facing problems caused by sea level rise. The Ministry of Natural Resources and Environment (MONRE) (2016) predicts that a sea-level rise of 100cm will impact more than 1.5 million hectares, approximately 39% of total area of the MRD.

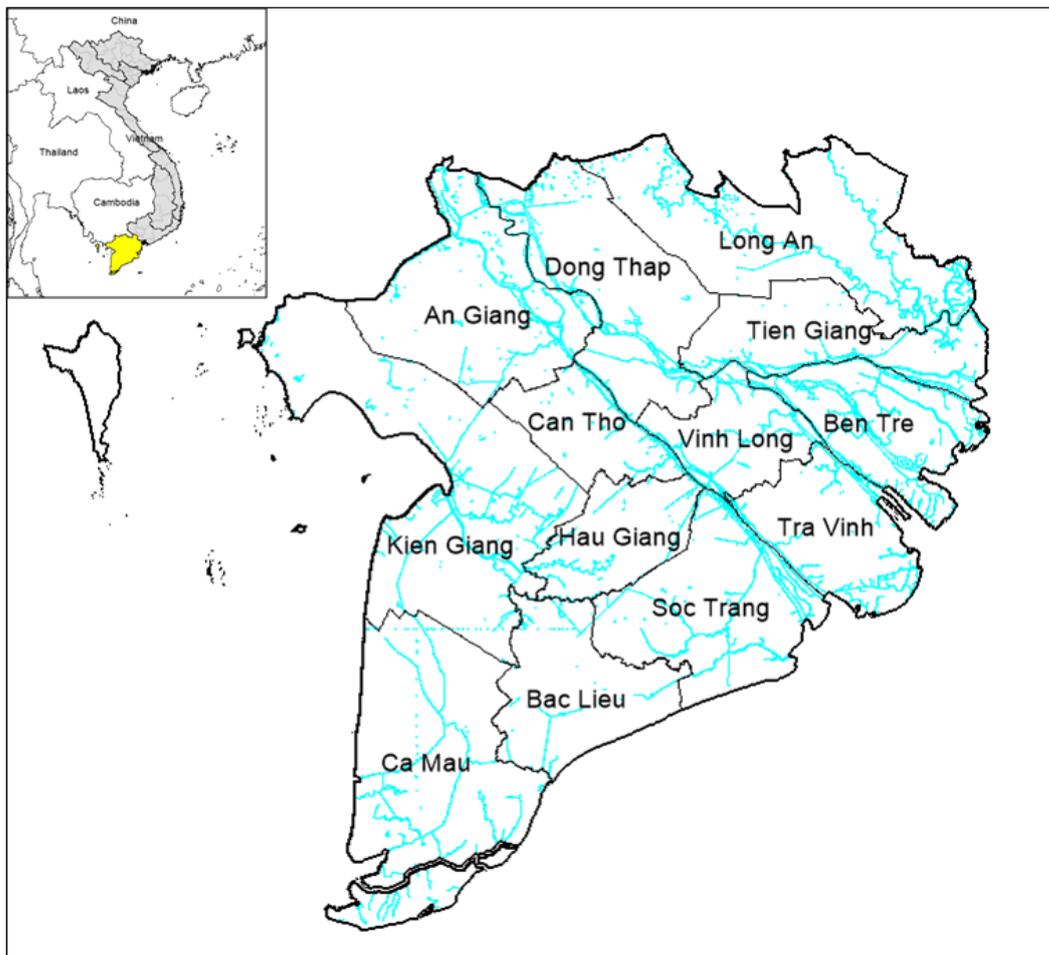


Figure 1. Location of the Mekong River Delta in the map of Vietnam

In recent years, a number of national programs have been conducted by international and national organizations to pursue sustainable development of agriculture in the MRD under increasing impacts of climate change. Starting from 2010, the Mekong Delta Plan (Gov, 2013) has been developed, presenting 'no-regret' and priority measures for long-term adaptation in upper, middle, and coastal zones of the region. The recommendations mostly focus on structural interventions, such as upgrading systems for flood protection, flood diversion, salinity intrusion prevention, and fresh water storage. In accordance with the key recommendations given in the Mekong Delta Plan, an on-going national program (World Bank, 2016) targets the improvement of infrastructure, information system, and capacity building to enhance climate-smart planning, and integrate land and water management and sustainable livelihoods in nine provinces of the MRD. Similarly, the Vietnam government also invests in sustainable rice-based systems in the MRD (World Bank, 2015b) to support large-scale improvement of rice-farming practices. However, the main focuses are capacity building (i.e. training and demonstration), extension skills, equipment and facility support, infrastructure, and financing. Only few activities tackle farming practices.

In general, the large national programs often looked for institutional and structural options as 'no-regret' and priority measures to control water and protect agricultural land (Gov, 2013; Jica, 2013; World Bank, 2016); facilitate market opportunities (World Bank, 2015a) and private sector engagement (BRIA, 2015); enhance capacity and agricultural extension (IFAD, 2013; World Bank, 2015b); and few of them promoted climate change adaptation and mitigation measures to farmers (ACIAR, 2011; GIZ, 2016).

At smaller scale (i.e. sub-ecological zone and province), many research projects implemented by research organizations tried to analyze and simulate impacts of drought, flooding, and salinity intrusion to agriculture production in the MRD. Most of the studies used modelling approach to develop recommendations (Hoanh C.T. et al., 2001; MONRE, 2016; Van and Son, 2016). However, proposed measures were not detailed enough for implementation at provincial level. Biophysical and socioeconomic analysis of the MRD showed levels of flooding, drought, and salinity intrusion impacts are complicated, depending on temporal and spatial occurrence of multi hydro-climate-related factors (Phong and Wassmann, 2016). Therefore, no "one size fits all" solution can be applied to whole MRD. Some research considered site-specific conditions but the recommended adaptation measures were applicable in small scale (Mackay and Russell, 2011; Dinh et al., 2016; Toan et al., 2016).

Development of climate change adaptation options for the MRD requires both "hard and soft strategies". Beside the "hard" interventions such as dams, sluice gates, canals, and other infrastructures in the upstream and downstream areas, "soft" interventions such as capacity

building, agriculture extension, and climate-smart agriculture technologies and practices (CSA T&P) need to be considered.

Every year, the MRD experience the effect of salinity and drought during the winter-spring season and flooding during the autumn-winter season. Climatic phenomena like El Niño and La Niña have made the situation in the area even worse. Although climate-related problems in the MRD are clearly recognized, damage to agriculture, especially rice production, in the region is still a big issue. In 2011, the severe flood damaged 27,000 ha of crops, of which, crop yield of 10,000 ha was completely lost (Ngoc Anh, 2011). In 2016, El Niño reduced the rice production by 700,000 tons and affected 339,234 ha of the winter-spring rice cultivation area (21.8% of the total area in the MRD).

In an assessment done by CGIAR centers of the 2016 El Niño, it was found that official warnings of expected salinity and drought problems during the winter-spring season reached the farmers early. However, these warnings did not translate to adjusted agricultural production on a larger scale. The warnings were ignored because of some possible reasons, such as: the expected severity of the impacts of El Niño was not communicated effectively; and the alternatives higher than the production subsidy were not available to farmers.

Following up on the results of the assessment study, the Department of Crop Production (DCP), in cooperation with CGIAR Research Program on Climate Change, Agriculture and Food Security Southeast Asia (CCAFS SEA) and other institutions, implemented a study titled “Developing flooding and saline intrusion risk maps and identifying adaptive cropping systems and cropping calendar for provinces in the Mekong River Delta” which started through a workshop in November 2016.

To fine-tune the outputs developed by each province, the workshop was followed by a series of consultation meetings with the Department of Agriculture and Rural Development (DARD) of MRD provinces from March to May 2017. Based on the detailed discussions on the flood, drought, and salinity intrusion risks, and with recommendations for short, medium, and long term adaptation measures from the provinces, DCP proposed a plan to restructure the rice-based cropping systems and a calendar for the sub-ecological zones using regional integration approach.

Objectives of the study

The activity intended to support DCP and MRD’s provinces in recognizing climate-related risks and developing regional and provincial climate change adaptation plan for rice sector. Specifically, the project aimed to:

- Develop maps of salinity intrusion and flooding risks for all 13 provinces of the MRD;
- Develop adaptation plan for rice production taking into consideration the local specific conditions and the conflicts in land and water management by different provinces; and
- Support climate-smart management of rice production in the MRD.

Methodologies

The participatory development of climate-related risk maps and adaptive plan (Climate Smart/CS MAP) for rice-based cropping system was developed by CCAFS SEA in early 2016. The CS MAP was piloted in a province of the MRD to (1) explore common understanding flood and salinity risks; (2) see how local knowledge can be used in developing risk maps; and (3) identify the gaps in the methodology for necessary improvement. Key informants from four administrative scales (i.e. province, district, commune, and village), who are familiar with hydrological and cropping systems, were invited to participate in the mapping process.

Findings of the pilot test were presented to experts and officials of DCP to refine the CS MAP components and processes. The standardized CS MAP was implemented for all 13 MRD's provinces. The initial outputs were improved and verified with the provincial experts through separate meetings in each province. The final risk maps and adaptation plans developed by the provinces were combined and discussed to identify the potentials and constraints in the actual implementation, considering the regional context.

Input data

Climatic and hydrological information were provided to participants by national research institutes. Long-term and short-term weather forecast and climatic trend in the MRD were provided by the National Centre for Hydro-Meteorological Forecasting (NCHMF), and the Southern Hydro-Meteorological Center (SHMC), respectively; and the responsive options for water resource management proposed by the Southern Institute of Water Resources Research (SIWRR); Effects of climate change to land use, especially the future effects of flooding and salinity intrusion to rice-based cropping systems, in the region were given by CLUES project.

The provincial topographic maps at scale of 1:100.000, which is detailed enough to see landmarks, infrastructures, and land use patterns at district level, were used as the based map. The most recent land-use map (2010) was also collected to identify rice lands and rice-based

cropping systems of each province and of the MRD region. All maps were printed to facilitate discussion among stakeholders.

Stakeholders of the participatory mapping

Multi-stakeholders dialogue stimulating local knowledge is the backbone of the participatory mapping process. Inputs from local experts together with scientific bases provided by researchers are crucial materials that were used to recognize and delineate spatial distribution of climate-related risks. To have multidisciplinary collaboration in the CS MAP implementation, experts and officials from the provincial DARD, National Hydro-Meteorological Service (NHMS), hydrological and meteorological stations, research institutes, universities, and international NGOs and donors were invited to join the discussion.

Definition of climate-related risk levels

Risk levels used in CS MAP were defined by the stakeholders. Accordingly, risk level refers to the possible loss in rice production due to the impacts of flooding and/or salinity intrusion in relation with the current status of natural resources, infrastructure, and management practices.

Participatory mapping

Participatory mapping was carried out through several multi-stakeholders dialogues. The first dialogue was organized with attendance of representatives of 13 MRD provinces. In this meeting, the guidelines for discussion was also prepared and distributed to participants. Participants were grouped by province and discussed with the assistance of facilitators. Outputs of the first meeting were then verified and refined by individual provincial DARDs through separate visits. Finally, another dialogue was organized again for all 13 MRD provinces to match the plans of individual provinces into plans of ecological zones and whole MRD.

In general, the participatory mapping process can be summarized in five steps:

The first step: Identify climate-related risks. In the first multi-stakeholders dialogue, participants of each group report recent crop damages and yield losses caused by natural hazards in the province, and analyze information given by researchers to recognize potential risks in the future. Key climate-related risks for rice production of the province are then determined.

The second step: Delineate boundary of risk levels. Paper maps and transparent plastic layers were used to facilitate discussion and mapping process during the first multi-stakeholders

dialogue. Participants identified areas that are exposed and sensitive to the recognized risks by province. Boundary of potential affected areas was delineated directly on the paper map. Local staff analysed situation of existing infrastructures, such as protection dykes, irrigation and drainage canals, sluice gates, pumping stations, relative elevation of rice fields, among others, and assumed the level of damage of rice planting areas if hazards, particularly the flooding and salinity intrusion, occur. Analysis was made following two scenarios: the normal and the severe event. Latest extreme events and their affected areas were taken into consideration to localize sphere and intensity of the risks. Outputs of the second step were separate map layers with detailed notations.

The third step: Propose corresponding adaptive plans. This step also belongs to the first multi-stakeholders dialogue. Participants discussed on adaptive plans for each area of the province, corresponding to risk levels. Local knowledge was used in analysing availability of resources (e.g. water sources, quality of water, soil type, and topographic features), capacity of infrastructures and farming habit to propose relevant adaptive plans. The proposed plans were embedded with potential affected areas and described as layers of the map.

Risk maps and proposed adaptive plans of all provinces were then merged and presented to participants to get feedback and address possible operational conflicts, such as water sharing and management scheme, side-effect management, and other related issues.

The fourth step: Fine tune and verify risk maps and adaptive plans. Some of the local experts, who are familiar with rice production of the province, were not able to attend the first dialogue. They may have different view on risk assessment and adaptive options. Given this situation, a second multi-stakeholders dialogue was organized in the individual provinces. In each province, leaders of provincial DARD, representatives of the Crop Production Office (CPO) and the Hydrology Management Office (HMO), and related local agencies were invited to participate the meeting. The risk maps and proposed adaptive plans of the province were represented to participants. The maps and plans were refined and updated. Lastly, the final risk maps associated with adaptive plans were digitized using Geographic Information System (GIS) tools.

The fifth step: Integrate adaptive plans of individual province into ecological zone and regional plans. This step was carried out through the third multi-stakeholders dialogue. A workshop was organized with participation of stakeholders from all provinces and research institutes. In this workshop, participants were grouped by ecological zones of the MRD. Cross-province issues related to climate change risk management and action plans for implementation of adaptive options, which were emerged during the group discussion, were reported to policy makers, researchers, and other stakeholders. Integration plan was then developed for each province and for the whole region.

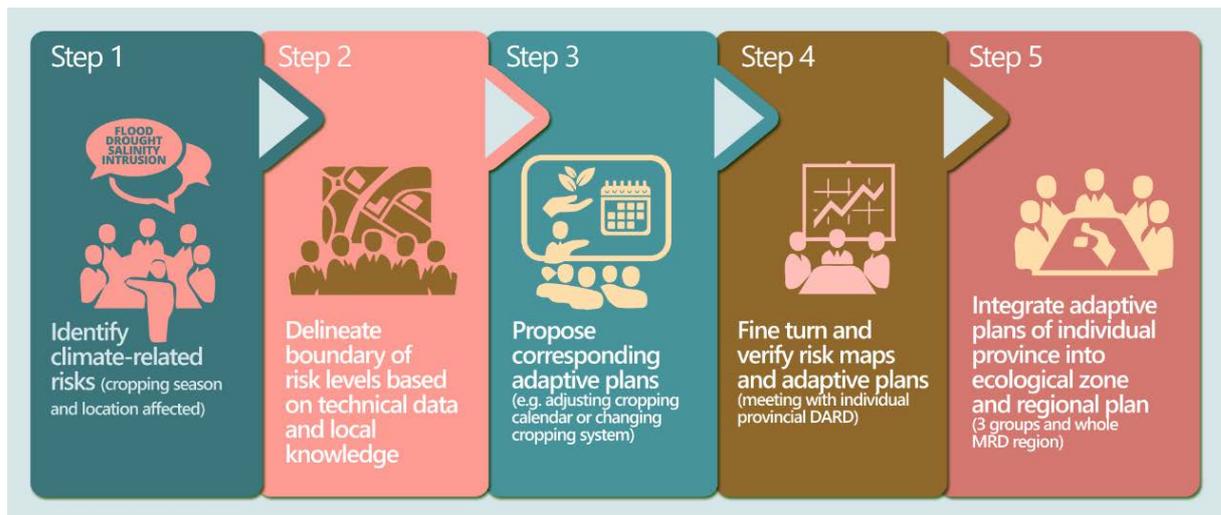


Figure 2. An illustration of the CS MAP process

B. Implementation of CS MAP

Pilot of CS MAP

The CS MAP methodology was piloted in early October 2016 at four administrative levels: province (Bac Lieu), district (Vinh Loi), commune (Chau Thoi), and village (Tra Hat) of Bac Lieu province. There were different understanding and definition of climate-related risks depending on the key informant's expertise and perception. For example, officials from HMO categorized risk level as the frequency of salinity intrusion and concentration of dissolved salts in irrigation water. Accordingly, the intrusion of water with salt concentration greater than 4 g/L is considered as high risk for rice. This is in accordance with the results of researches on saline tolerance capacity of rice. Areas that have salinity intrusion occurred every year are also considered as the high risk.

According to the officials of the Agricultural Management Office (AMO) and the CPO, concentration of dissolved salts is not an important factor to define risk. A certain concentration level can be a high risk for double or triple rice system but may not be a major concern for single rice or rice-shrimp system. From their point of view, the start and duration of salinity intrusion significantly define levels of rice yield reduction. This is also true because the high saline-tolerant rice varieties cannot sustain under long saline period (i.e. more than 10 days with concentration of 4 g/l).

In protected areas, shortage of fresh water for irrigation during saline period was another issue raised by the key informants. Experience from the salinity intrusion event occurred during the winter-spring season shows that rice yield in many well-protected areas dropped significantly

because the water in all surrounding irrigation canals is saline. Therefore, rice is likely damaged by drought rather than saline water.

There are similar issues for identifying and categorizing flooding risk. Frequency, depth, duration, and timing of floods should be the factors to be considered. These caused a lot of confusion in the development of the risk maps at any administrative scale.

Using multi-factor risk assessment is difficult for local officials and managers because they are not familiar with technical terms and parameters that are often used by scientists. Furthermore, the key informants have different backgrounds and perspectives on risks and responsive strategies. People from HMO are very familiar with the details of irrigation system and can easily delineate affected areas, but lack knowledge of cropping system and crop production. Contrarily, people from CPO tend to know about crop-related issues better than hydrological systems.

Other key informants referred risk levels as the reduction of rice yield caused by flood or salinity intrusion, following the recent assessment guidelines of MARD. The guidelines have been developed to estimate damage and provide relief to the affected areas. Accordingly, there are three levels of loss: serious (reduction of more than 70% of rice yield), medium (from 30% – 70% of rice yield), and low (below 30% of rice yield). It is obvious that these criteria are very practical for local officials. Whereby, the intensity and duration factors of the extreme climate events can largely affect the level of yield loss.

Findings from the pilot of CS MAP were presented to the experts and officials of DCP-MARD through a consultation meeting. The following agreements were made:

1. Development of CS MAP has to be done with engagement of different disciplines, especially, the HMO and CPO officials. Other organizations can be involved to input and facilitate CS MAP process such as research institutes, universities, and international agencies.
2. Using potential reductions of rice yield to qualify levels of flooding and salinity intrusion risks. Accordingly, there are four risk levels:
 - High risk: possible loss of more than 70% of rice production
 - Medium risk: possible loss of 30% – 70% of rice production
 - Low: possible loss of less than 30% of rice production
 - Not affected: no impact to rice production because the rice area is fully protected or rice-based system has been shifted to avoid possible risks.

3. For the MRD, drought and salinity intrusion are two phenomena of a single extreme event. Therefore, potential reduction of rice production that is resulted from drought or salinity intrusion can be combined as a single risk.

Development of risk maps and adaptive plans

The first multi-stakeholders dialogue was organized in Can Tho City in November 2016 with attendance of about 130 participants from 13 provincial DARDs, DCP, eight national research institutes, two hydro-meteorological centers, and international organizations.

By integrating science evidence provided by researchers and experts, local stakeholders used indigenous knowledge on local topography, current infrastructure, hydrological management scheme, and land use plans to delineate potentially affected areas directly on the printed map. The maps of flooding and salinity intrusion risks for provinces have been done for two risk scenarios: (a) moderate intensity and duration (normal year) and (b) extreme intensity and prolong duration (severe year).

Figure 3 shows the map of rice-based system in 2010 of Soc Trang, a coastal province of the MRD. More than 50% of the rice lands were used for triple-rice cropping (dark green regions), which includes winter-spring rice (November to February), summer-autumn rice (April to July), and autumn-winter rice (August to November). The remaining rice areas are for single (yellow regions) and double-rice (light green regions) cropping, and rice-shrimp rotation (blue regions). As being located in the coastal zone and close to river mouths, the province is exposed to the impacts of salinity intrusion, especially during ENSO years.

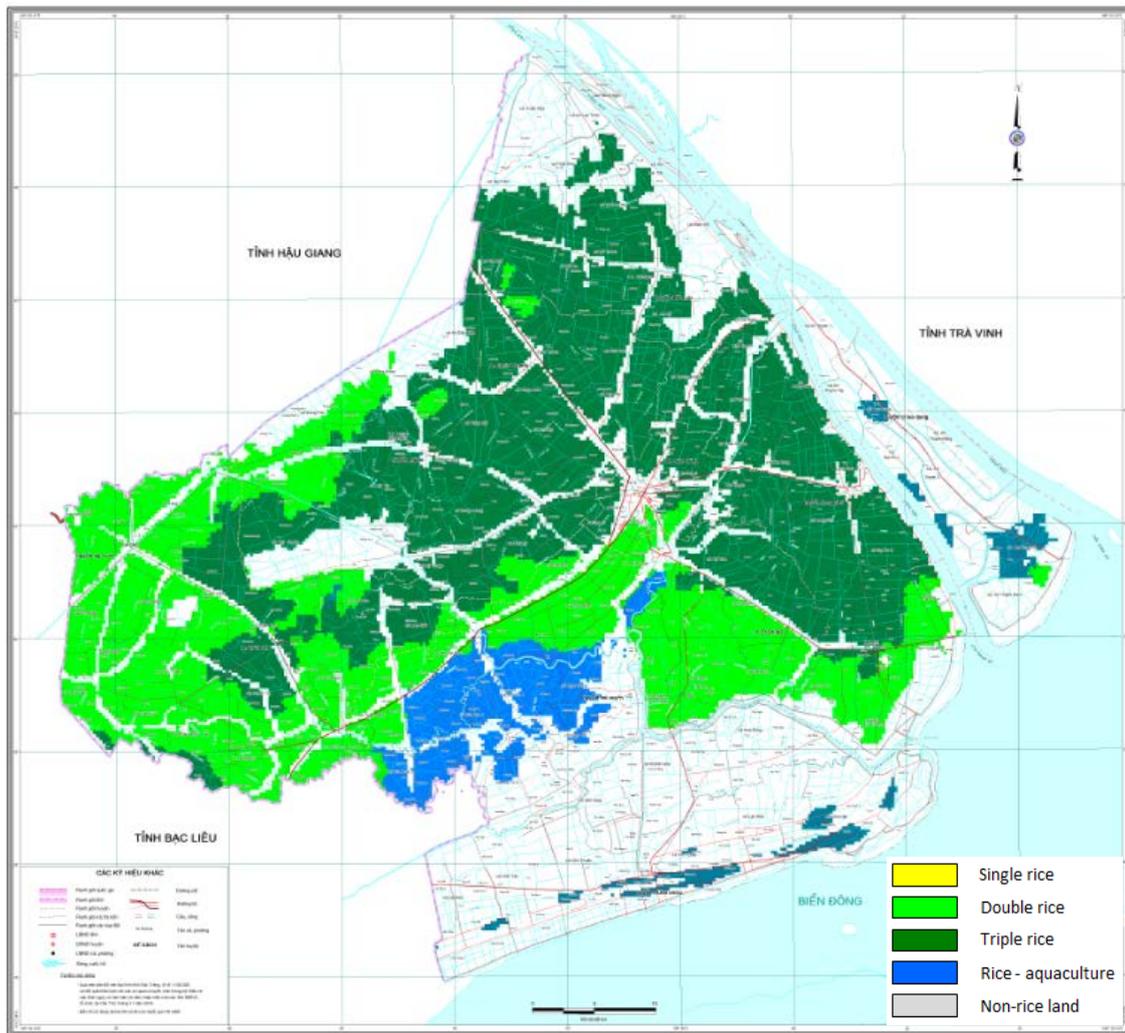


Figure 3. Maps of rice-based systems in 2010 of Soc Trang province

In normal years (Figure 4.a1), salinity intrusion may only occur from February to March in the north and west parts of the province. When this happens, rice yield in the winter-spring season can reduce up to 70% (orange region) in Nga Nam district and below 30% (yellow region) in My Tu and Ke Sach districts. Other rice areas are not affected (green region). In severe years (e.g. 2015–2016) (Figure 4.a2), there is a high possibility that about two-third of rice lands of the province is damaged by saline water. Most of rice fields along Hau River and close to Bac Lieu province are under the high risk (red region), which may result to yield loss of more than 70%. Risk level of some areas also rises from medium in normal years to high when extreme salinity intrusion occurs. In addition, a large rice land belonging to Thanh Tri, My Xuyen, and Chau Thanh districts in the center of the province could be at medium risk due to intrusion of saline water in the irrigation canals. Only rice lands located in the middle of the province are not affected.

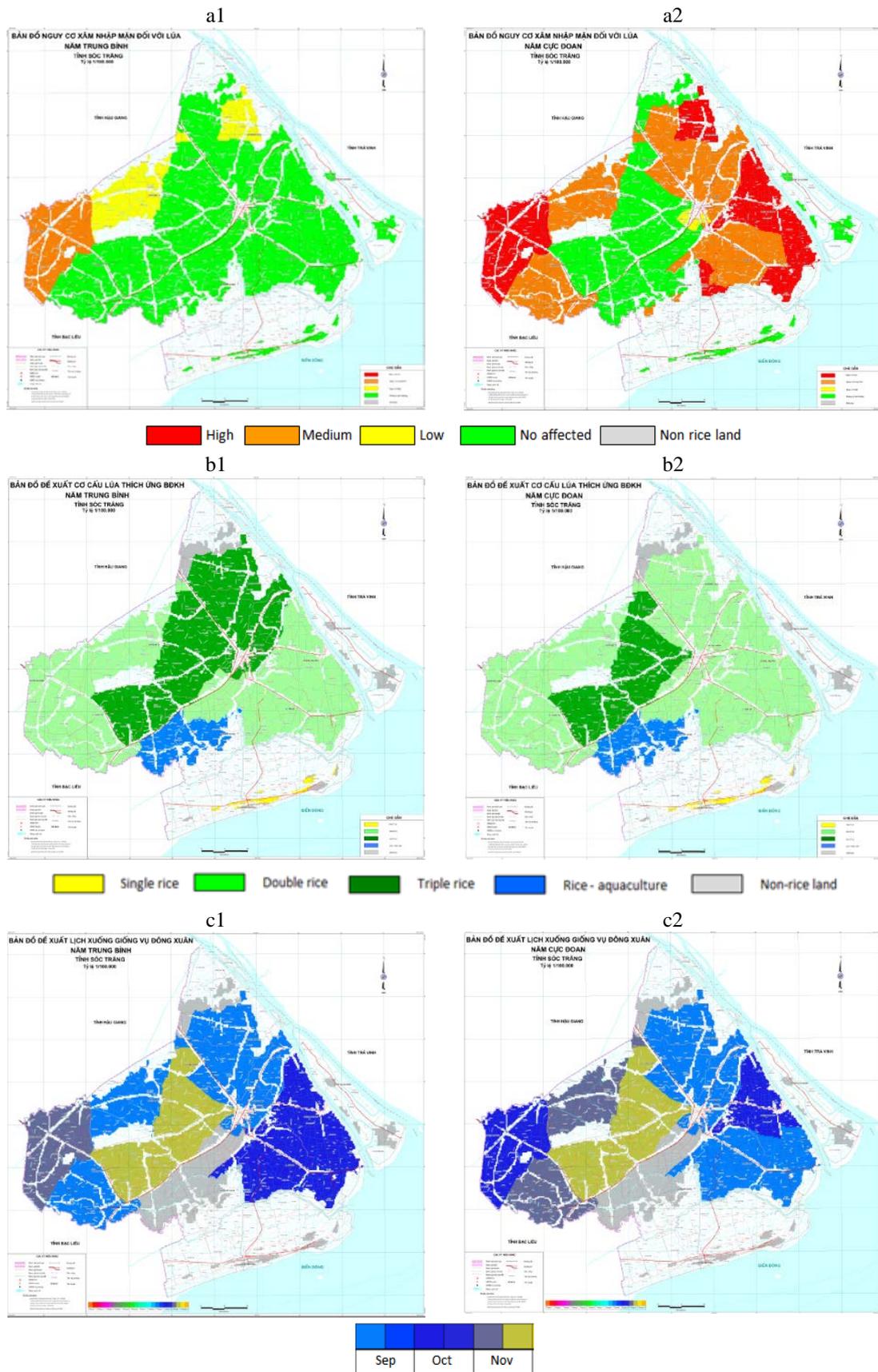


Figure 4. Maps of salinity intrusion risk in (a1) normal year and in (a2) severe year, and proposed adaptive cropping systems (b1 and b2) and planting calendar (c1 and c2) in the two scenarios, respectively.

With awareness of the increasing problems that may happen in the future caused by climate change, participants from Soc Trang province have proposed two adaptive plans corresponding to two salinity intrusion scenarios. To minimize yield loss due to salinity intrusion, the province will shift one-third and two-third area of current triple-rice to double-rice in normal years (Figure 4.b1) and in severe years (Figure 4.b2), respectively. Rice in the high-risk seasons can be replaced with cash crops. Together with changes in cropping system, planting time of rice seasons will also be adjusted. Particularly, winter-spring rice will start between September and October, about a month earlier than current planting calendar, to avoid drought and saline problems at the end of the season (Figure 4.c1 and 4.c2).

Similar maps and plans have been developed for individual provinces of the MRD by the participants.

Cross provincial issues

The MRD is the biggest rice production area of Vietnam. It contributes more than a half of the total domestic rice production and more than 90% of Vietnam's rice export annually. Therefore, maintaining rice production under increasing impact of climate change, while reducing input costs in large scale mechanization and irrigation management and ensuring the stable market price, is the major concern of the managers and policy makers.

In the MRD, agriculture production of adjacent provinces strongly influenced each other through their land use decision, water sharing scheme, and farming practice. For example, water holding strategy of upstream provinces may lead to water shortage problem in downstream regions, or improper shrimp farming techniques of coastal regions may result in intrusion of saline water in rice lands. Given the regional context, changes in rice-based system and rice planting calendar of a province have to be in accordance with other adjacent provinces. Therefore, maps and plans have to be combined to present the regional picture.

In July 2017, combined maps and provincial plans were shown to more than 100 participants from provincial DARDs, researchers, and experts in the third multi-stakeholders dialogue. Participants were grouped according to the three ecological zones of the MRD:

- The upper delta zone: An Giang, Kien Giang, Dong Thap, and Long An provinces
- The middle delta zone: Can Tho, Vinh Long, Tien Giang, and Hau Giang provinces
- The lower delta zone: Ca Mau, Bac Lieu, Soc Trang, Tra Vinh, and Ben Tre provinces

The main discussion points related to cross-provincial issues were:

- Update on the on-going construction and research projects of provinces;

- Mismatch of land use plan and water management among provinces;
- Cross-provincial solutions for common climate-related problems;
- Development of sharing platform for adjacent provinces to enhance co-benefits from the individual changes; and
- Regional implementation plan.

Figure 5 shows how maps were merged into a flooding risk map of whole MRD region. Figure 6 presents the final map of flooding risk for rice production in severe years of the MRD.



Figure 5. Participants from 13 provinces of the MRD were discussing on risk maps and adaptive plans in cross-provincial and regional context

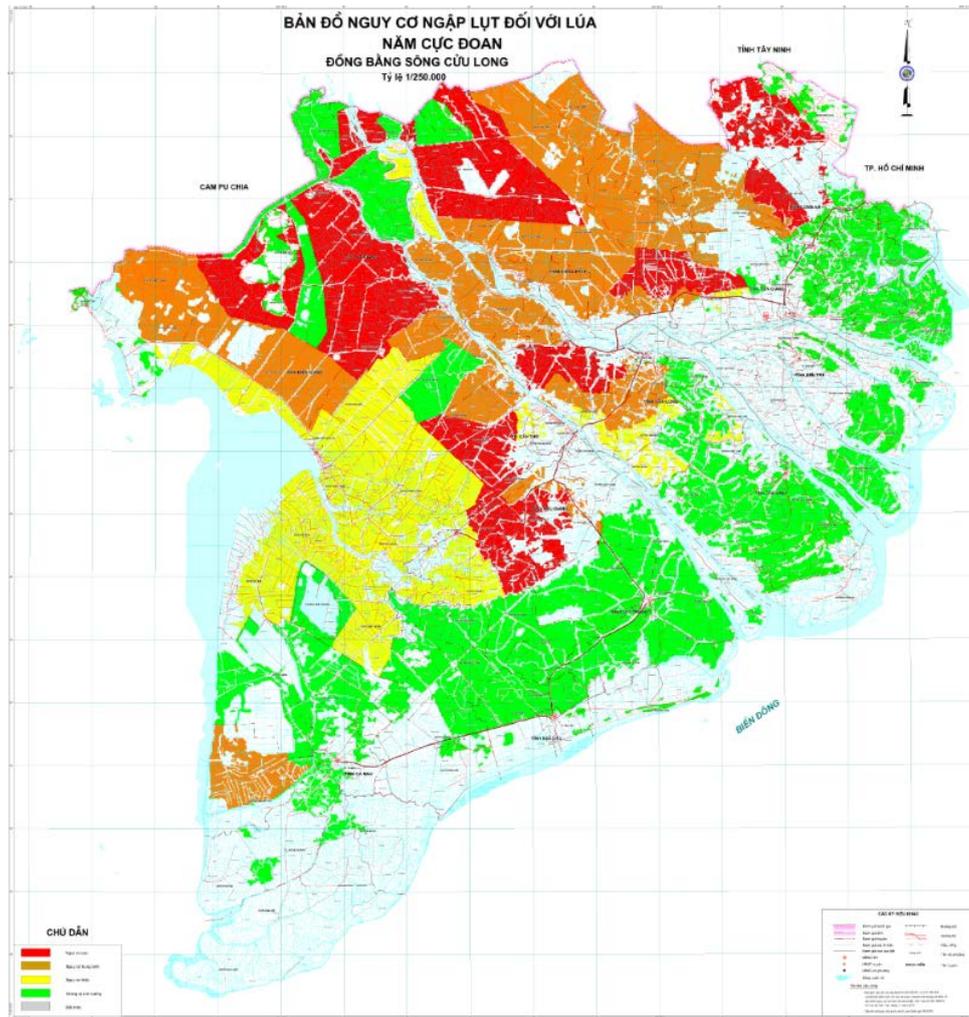


Figure 6. Map of flooding risk for rice production in severe years of the MRD

The followings are recommendations made by the participants:

- Cross-provincial intervention does not only mean integration of rice production but should also include sharing of resources, especially irrigation water, to ensure regional benefit. Therefore, sowing/transplanting date, irrigation or drainage schedule, and structural investments of a province have to be shared to others.
- Cross-provincial intervention needs a management unit. It can be combined with the South-West Steering Committee, a key regional political institution in Vietnam, which has a relevant mandate.
- Beyond the cross-provincial interventions for climate-related risk management, it is also needed to build linkages among private sectors, farmers, scientists, and the government to promote sustainable rice production in the region.

- Regarding the risk maps, provinces need to downscale and supplement local specific factors, such as acid sulphate soil, drainage and irrigation conditions, to improve map quality and corresponding adaptive plans.
- Beside climatic early warning and weather forecast, prediction of future market price also needs to be done because it is an important information in the planning and decision making process.
- For sustainable rice production of the MRD, changing cropping calendar and system cannot be done alone but have to be implemented together with structural measures, water saving technologies, tolerant varieties, and policy and institution.

These recommendations have been considered by the DCP for future development of directions and management programs.

Initial outcomes

Results obtained from the implementation of CS MAP were highly appreciated by DCP and provincial DARD leaders. The maps and proposed adaptation plans are considered as important information in developing the short, medium, and long term agricultural land use plans of the individual provinces, as well as of the whole MRD.

On 22 February 2017, the DCP issued the official Circular number 184/TT-CLT (Appendix 2) to request the MRD's provinces to develop action plan for actual implementation of adaptive rice-based systems and cropping calendar.

Responding to DCP's request, several provinces have implemented their proposed plans. Tien Giang, a coastal province that is frequently affected by salinity intrusion and tidal rise, has integrated the adaptive rice-based systems in their land use planning. This was done under the provincial program titled "Cutting and shifting cropping system and calendar for eastern districts of Tien Giang province up to 2025". Accordingly, the eastern districts will only apply double rice cropping or rice-cash crops rotation. The change will be implemented on more than 26,000 ha of agriculture land, including 23,000 ha for shifting triple rice to double rice, and 3,000 ha for converting rice land to fruit trees. In addition, shifting rice planting date was also planned for 4,128 ha. At present, the province has applied the changes for 15,217 ha, approximately 59% of the planned value.

To cope with annual flooding (from October to November), An Giang province has decided to shift the autumn-winter rice season earlier for both outside and inside dyke system to ensure

safe harvest before October. Three provinces (Long An, Dong Thap, and Soc Trang) are also continuing to refine the maps on their own initiative.

C. Conclusion

The CS MAP is a participatory approach that actively engages experts from various local and national offices to come up with implementable local solutions to climate change related impacts. It involves (1) identifying climate-related risks; (2) delineating affected areas and risk levels; (3) proposing corresponding adaptive plans; (4) fine tuning and verifying proposed measures; and (5) developing integrated provincial and regional adaptation plans. The CS MAP is a useful approach to help agricultural managers and planners better delineate location and time of climate-related risks; and identify specific response measures. It integrates scientific findings and local expert knowledge. Practical risk maps and adaptation options can be quickly developed with low cost requirement.

With CS MAP, provinces can easily develop their own adaptive plans. Local specific conditions are better integrated in land use decision making and, therefore, solutions are more relevant to local context. Among the common adaptive options proposed by provinces include changing rice-based cropping systems and sowing/transplanting calendars. CS MAP is now being developed at different stages for 13 provinces in the MRD. Some provinces are implementing the adopted measures and developing the corresponding monitoring and reporting tools. It can also be further downscaled to district and commune scale to improve precision.

The participatory development of climate-related risk maps and adaptive plan in this study was developed for rice production but has potential to be adapted for other crops, aquaculture, and livestock. The provinces and districts can also continue to refine the maps for various purposes including poverty mapping, relief operations, among others.

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Appendix 1. Some pictures of provincial discussions during the CS MAP development



A. Officials of Tra Vinh DARD showed the affected rice areas in the province during the last severe El Niño event.



B. CCAFS experts and DCP official discussed the adaptation strategies in Dong Thap province.



C. Various stakeholders worked together to refine the CS MAP in An Giang province

Appendix 2. Circular 184/TT-CLT of the Department of Crop Production (available at <http://www.cuctrongtrot.gov.vn/TinTuc/Index/3607>) issued after the Can Tho workshop held in November 2016, instructing the provinces to develop agriculture production plans for the summer-autumn season following the crop calendar and cropping system based on the risk maps

Uab Cue

BỘ NÔNG NGHIỆP
VÀ PHÁT TRIỂN NÔNG THÔN
CỤC TRỒNG TRỌT

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập - Tự do - Hạnh phúc

Số: **184** /TT-CLT

Hà Nội, ngày **22** tháng **02** năm **2017**

V/v tăng cường chỉ đạo chăm sóc lúa Đông
Xuân và triển khai kế hoạch sản xuất vụ Hè
Thu 2017 vùng Nam bộ

Kính gửi: Chi cục Trồng trọt và BVTV các tỉnh, thành Nam bộ

Theo báo cáo tiến độ sản xuất của các địa phương, đến nay diện tích lúa Đông Xuân 2016-2017 tại các tỉnh Đồng bằng sông Cửu Long (ĐBSCL) đã thu hoạch được hơn 410 nghìn ha/1.530 nghìn ha gieo cấy, đạt khoảng 27%; tại các tỉnh Đông Nam bộ lúa đang trong giai đoạn vào chắc, chín sắp chuẩn bị thu hoạch; diện tích lúa Hè Thu sớm (Xuân Hè) đã xuống giống tại các tỉnh ĐBSCL được khoảng 165 nghìn ha/1.657 nghìn ha kế hoạch, đạt khoảng 10%.

Để đảm bảo sản xuất lúa vụ Đông Xuân 2016-2017 thắng lợi, triển khai sản xuất lúa vụ Hè thu 2017 đảm bảo kế hoạch, Cục Trồng trọt đề nghị Chi cục Trồng trọt và BVTV các tỉnh, thành Nam bộ tập trung chỉ đạo một số nội dung như sau:

1. Đối với sản xuất lúa vụ Đông Xuân 2016-2017

- Tăng cường tuyên truyền, hướng dẫn nông dân tích cực áp dụng các biện pháp kỹ thuật chăm sóc lúa, tích trữ đủ nguồn nước để cung cấp cho cây lúa đặc biệt vào các giai đoạn mẫn cảm như làm đồng, trở bông; bón cân đối các loại phân theo khuyến cáo, không bón dư đạm để hạn chế sâu bệnh và tránh lép đỏ; không phun các loại phân bón lá chứa chất kích thích sinh trưởng vào giai đoạn lúa đã trở - chín làm lúa trở không tập trung, giảm tỷ lệ hạt chắc và gây lép đỏ, làm giảm chất lượng gạo khi xay chày;

- Theo dõi chặt chẽ diễn biến thời tiết, nếu xuất hiện các trận mưa lớn trái mùa gây ngập úng và lốc xoáy gây đổ ngã cho lúa phải tập trung các phương tiện bơm thoát nước nhanh chóng và thu hoạch kịp thời diện tích đã chín với phương châm “xanh nhà hơn già đồng”.

- Theo dõi chặt chẽ diễn biến sâu bệnh hại để chỉ đạo phòng trừ kịp thời bằng các loại thuốc đặc hiệu có trong danh mục theo quy định.

- Nếu xảy ra xâm nhập mặn cục bộ ở một số diện tích lúa chưa chín, khuyến cáo nông dân áp dụng các kỹ thuật canh tác theo tài liệu hướng dẫn đối với vụ Đông Xuân 2016-2017 đã ban hành.

- Thống kê kịp thời diện tích, năng suất, giá bán các trà lúa Đông Xuân để báo cáo về Cục theo mẫu báo cáo định kỳ đã gửi các Chi cục.

2. Triển khai kế hoạch sản xuất lúa vụ Hè Thu 2017

a. Đối với diện tích lúa Hè Thu sớm đã gieo cấy:

- Đảm bảo đủ nước tưới dưỡng cho lúa, khuyến cáo nông dân chăm sóc, bón thúc sớm, tập trung và bón cân đối NPK tạo điều kiện cho lúa đẻ nhánh sớm, tập trung, tăng dành hữu hiệu, tăng khả năng chống chịu ngay từ giai đoạn đầu;

- Chỉ đạo các đơn vị chuyên ngành tăng cường kiểm tra đồng ruộng phát hiện và xử lý nhanh, kịp thời các ổ sâu bệnh phát sinh, nhất là trong điều kiện nắng nóng, có mưa xen kẽ;

- Chủ động các phương án tiêu thoát nước để phòng mưa lớn bất thường.

b. Đối với diện tích lúa Hè Thu chưa gieo cấy:

Đề nghị các địa phương cần tập trung xây dựng kế hoạch sản xuất vụ Hè thu 2017 đảm bảo một số vấn đề sau:

- Về thời vụ: Xây dựng kế hoạch thời vụ chặt chẽ đối với từng tiểu vùng sinh thái để né hạn đầu vụ, lũ cuối vụ và lũ đầu vụ Thu Đông 2017 theo tinh thần đã thống nhất tại hội thảo ***“Xây dựng bản đồ vùng có nguy cơ bị lũ lụt, hạn hán, xâm ngập mặn và xác định cơ cấu, thời vụ cây trồng thích ứng với biến đổi khí hậu tại các tỉnh Đồng bằng sông Cửu Long”*** ngày 17 và 18 tháng 11 năm 2016 tại Thành phố Cần Thơ.

- Về cơ cấu giống: xác định cơ cấu giống cho từng tiểu vùng theo hướng tăng cường gieo sạ các nhóm giống lúa chất lượng có khả năng xuất khẩu, hạn chế gieo sạ các giống lúa kém chất lượng, giá thành thấp. Tuy nhiên, cần theo dõi sát thị trường để khuyến cáo nông dân gieo sạ các giống lúa phù hợp, đặc biệt duy trì đúng quy hoạch diện tích sạ các giống lúa nếp, không để nông dân tăng diện tích một cách tự phát để xảy ra rủi ro về thị trường tiêu thụ.

Trên đây là một số nhiệm vụ cấp bách cần tập trung thực hiện, đề nghị Chi cục Trồng trọt và Bảo vệ thực vật các tỉnh, thành Nam bộ quan tâm chỉ đạo thực hiện và báo cáo kế hoạch sản xuất vụ Hè Thu 2017 về Cục Trồng trọt trước **ngày 25/02/2017** theo địa chỉ Email: tungctt@gmail.com; hanh75ctt@gmail.com hoặc theo đường công văn về Văn phòng Cục phía Nam. Trong quá trình chỉ đạo, nếu có vấn đề gì phát sinh đột xuất cần phản ánh nhanh với Cục để có biện pháp phối hợp chỉ đạo kịp thời./.

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- Lưu: VT, CLT, VPPN.

CỤC TRƯỞNG

Nguyễn Hồng Sơn



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